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(54) Title: NON-CONTACT PRINTED COMESTIBLE PRODUCTS AND APPARATUS AND METHOD FOR PRODUCING SAME

(57) Abstract: The present disclosure provides apparatuses and methods for non-contact printing on comestible products. The comestible products include an edible ink-indicia non-contact printed on a surface of an edible substrate. The comestible products may also include an organoleptic component dispensed on the edible substrate surface. The edible ink-indicia and the organoleptic component increase the consumer appeal for the product.



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## TITLE

**NON-CONTACT PRINTED COMESTIBLE PRODUCTS AND APPARATUS  
AND METHOD FOR PRODUCING SAME**

## BACKGROUND

[001] The present disclosure relates generally to confectionery products. More specifically, the present disclosure relates to non-contact printed confectionery products and methods for producing same.

[002] There are numerous types of confectionery products or compositions having an edible ink printed thereon. Such confectionery products can include, for instance, chewing gum or candy. It is generally known to print edible inks onto confectionery products and that confectionery products having visually pleasing appearances can lead to enhanced marketability with consumers.

## SUMMARY

[003] The present disclosure provides systems, apparatuses, methods for producing comestibles products. In particular, non-contact printing of edible materials onto edible substrates is utilized to create multi-sensory enhancements to comestible products. This provides the present comestible products with improved consumer appeal. The comestible products of the present disclosure provide a visually attractive product that brings added excitement and enjoyment to product consumption.

[004] In an embodiment, an apparatus for producing a printed comestible product is provided. The apparatus includes an extruder for extruding a slab of an edible substrate and a non-contact printing device for printing an edible ink on the slab. The printing device may be an inkjet printing device. The apparatus may also include a dusting device, a sizing roller, a cutting device, a cooling device, a curing chamber, a coating device, a packaging device, and combinations thereof.

[005] The non-contact printing device may be located anywhere along the apparatus. The printing device may be located at a position downstream of the extruder and upstream of the dusting device, downstream of the dusting device and upstream of the sizing roller, downstream of the sizing roller and upstream of the

cutting device, downstream of the cutting device and upstream of the cooling device, downstream of the cooling device and upstream of the curing chamber, and downstream from the coating device.

[006] In an embodiment, the edible substrate may be any mass of edible material capable of being extruded. For instance, the edible substrate may be any farinaceous material and/or confectionery material. In an embodiment, the edible substrate may be a confectionery material such as a chewing gum.

[007] In an embodiment, the apparatus may include multiple printing devices. A first printing device may be located on a first side of the slab and a second printing device may be located on a second side of the slab. The first and second printing devices may print the edible ink on opposing sides of the slab. The first and second printing devices may print upon the slab simultaneously. Alternatively, the first and second printing devices may print sequentially upon the slab.

[008] In an embodiment, the printing device prints an edible ink-indicia on the slab. The edible ink-indicia may be the result of an edible ink composition dispensed from the printing device. The edible ink composition which forms the edible ink-indicia may be an absorbing ink, a solvent-based ink, a wax-based ink, and combinations thereof. In an embodiment, the composition of the edible ink may be adjusted based on the location of the printing device with respect to other components of the apparatus. In an embodiment, the edible ink composition may include an organoleptic component.

[009] In an embodiment, the printing device may print the edible ink uniformly on one or more surfaces of the slab. Alternatively, the printing device may print the edible ink at select locations along the slab.

[010] In an embodiment, the apparatus includes a cutting device for cutting the slab into individual pieces. The printing device may then print the edible ink on the individual pieces. In an embodiment, the individual pieces may be chewing gum in stick, tab, or pellet form and may be coated or uncoated. In a further embodiment, the individual pieces may be sealed center-filled chewing gum which may be coated or uncoated.

[011] In an embodiment, a method for producing a printed comestible product is provided. The method includes extruding a slab of an edible substrate and printing

an edible ink onto the slab using a printing device without contacting a surface of the slab with the printing device. The method may further include dispensing an organoleptic component onto the slab. The organoleptic component may be a component of the edible ink. Alternatively, the organoleptic component may be separate from the edible ink and may be dispensed by a dispensing device other than the printing device.

[012] In an embodiment, the method includes cutting the slab into individual confectionery pieces and printing the edible ink on the individual pieces. The individual pieces may be chewing gum (stick, pellet, tab) and/or a center-filled chewing gum. The method may further include coating the individual confectionery pieces before printing the edible ink thereon. The method may include placing the individual pieces in a package so that the edible ink is visible through the package. The package may be a blister package and the individual pieces may be placed in the blisters so that the edible ink is visible through the blisters.

[013] In an embodiment, the method includes printing the edible ink on multiple sides of the slab. The edible ink may be printed on a first side and on an opposing second side of the slab.

[014] In an embodiment, the method may include inkjet printing the edible ink on the slab.

[015] In an embodiment, the method may include moving the slab during the printing. Alternatively, the slab may be stationary when the edible ink is printed upon a surface of the slab. In an embodiment, the printing device may be moveable with respect to the slab.

[016] In an embodiment, a method for producing a printed comestible product is provided. The method includes extruding a rope of a center-filled confectionery material and printing an edible ink on the rope. The method may include forming the rope into individual pieces of center-filled confectionery material and printing the edible ink on the individual pieces. The method may further include placing the individual pieces of the center-filled confectionery material into a package so that the edible ink is visible through the package. The package may be a blister package and the individual pieces may be placed in the blisters so that the edible ink is visible through the blisters.



[017] In an embodiment, an edible product is provided. The edible product includes an edible substrate and an edible ink-indicia printed on the edible substrate. The edible ink-indicia has a feature. The edible product includes an organoleptic component corresponding to a feature of the edible ink-indicia.

[018] In an embodiment, the edible substrate may be a confectionery. The confectionery may be a coated confectionery, a chewing gum, a coated chewing gum, a center-filled chewing gum, or a coated center-filled chewing gum.

[019] In an embodiment, the edible ink-indicia may be a word, an image, a color, a symbol, an object, an alpha-numeric representation, a letter, text, a shape, a fanciful shape, a symbol, a logo, a graphic, or an advertising indicia. The edible ink-indicia is printed on one or more surfaces of the edible substrate.

[020] In an embodiment, the organoleptic component may be a flavoring agent, a cooling agent, a heating agent, a mouthfeel agent, a tingling agent, a fizzing agent, a sweetening agent, a souring agent, a bittering agent, a teeth whitening agent, a breath freshening agent, an anti-cavity agent, or an audible agent. One or more organoleptic components may be present on a edible substrate.

[021] In an embodiment, the feature may be a characteristic of the ink-indicia. The feature may be an element of the ink-indicia, a color of the ink-indicia, a meaning conveyed by the ink-indicia, a perception generated by the ink-indicia, or a concept communicated by the ink-indicia to a person viewing the ink-indicia. For example, the edible ink-indicia may include a word. The feature may be a meaning of the word and the organoleptic component may correspond to the meaning of the word.

[022] In an embodiment, the edible ink-indicia is an inkjet indicia. The edible ink-indicia may be a multicolor ink-indicia and/or a high-resolution ink-indicia.

[023] In an embodiment, a further edible product is provided. The edible product includes an edible substrate and an edible ink-indicia printed on the edible substrate. The edible substrate includes a feature. The edible product includes an organoleptic component corresponding to a feature of the edible substrate. The feature may be a property of the edible substrate such as a structure of the edible substrate, a composition of the edible substrate, an ingredient in the edible substrate, a surface texture of the edible substrate, or the hardness of the edible substrate.

[024] In an embodiment, the edible substrate is a chewing gum and the feature is a center-fill portion of the chewing gum. The organoleptic component corresponds to the center-fill portion.

[025] In an embodiment, an edible product is provided. The edible product includes an edible substrate having opposing first and second sides. A first edible ink-indicia is present on the first side and a second edible ink-indicia is present on the second side. A portion of the first edible ink-indicia contacts a portion of the second edible ink-indicia. The first and second edible ink-indicia contact each other along one or more edges of the edible substrate. The first and second edible ink-indicia are inkjet indicia. An organoleptic component may also be present on the edible substrate.

[026] In an embodiment, the first and second edible ink-indicia cover all, or substantially all, of the outer circumference or outer surface area of the edible substrate.

[027] In an embodiment, a method for producing an edible product is provided. The method includes non-contact printing an edible ink-indicia on an edible substrate. The method further includes placing on the edible substrate an organoleptic component that corresponds to a feature of the edible ink-indicia.

[028] In an embodiment, the method includes non-contact printing a word on the edible substrate and dispensing an organoleptic component that corresponds to a meaning of the word.

[029] In an embodiment, the method includes non-contact printing a high-resolution image on the edible substrate.

[030] In an embodiment, another method for producing an edible product is provided. The method includes non-contact printing an edible ink-indicia on an edible substrate and dispensing on the edible substrate an organoleptic component that corresponds to a feature of the edible substrate. The method may include forming a surface texture on the edible substrate, the surface texture being the feature. An organoleptic component corresponding to the surface texture is then dispensed on the edible substrate.

[031] In an embodiment, another method for preparing an edible product is provided. The method includes non-contact printing an edible ink-indicia on an edible substrate, and dispensing a precision dose of an organoleptic component on the edible

substrate. The precision dose may be dispensed by way of ink jet printing. The method may further include weighing the edible substrate to determine the precision dose.

[032] In an embodiment, a wrapped edible product is provided. The product includes an edible substrate having an edible advertising indicia located on a surface thereof. The product also includes a transparent wrapper. The edible advertising indicia is visible through the wrapper. The advertising indicia may be a high resolution image. The advertising indicia may further be an inkjet-indicia.

[033] In an embodiment, the advertising indicia may be substantially coextensive with the surface area of the edible substrate surface. In an embodiment, the advertising indicia may cover one or all exposed surfaces of the edible substrate to cover substantially all the surface area of the edible substrate.

[034] In an embodiment, an organoleptic component may be disposed on the edible substrate surface. In a further embodiment, the organoleptic component may correspond to a feature of the advertising indicia.

[035] In an embodiment, another wrapped edible product is provided. The wrapped edible product includes an edible substrate having an edible ink-indicia disposed on a surface thereof and a wrapper surrounding the edible substrate. The wrapper includes a wrapper indicia on an exposed surface. The wrapper indicia matches the edible ink-indicia. The wrapper indicia may be identical to the edible ink-indicia. Provision of the matching wrapper indicia gives the edible product the appearance of still being wrapped even after the wrapper is removed from the edible product.

[036] In an embodiment, a method for wrapping an edible product is provided. The method includes printing an edible advertising indicia on a surface of an edible substrate and wrapping the edible substrate in a transparent wrapper. The advertising indicia is visible through the wrapper. The method may include printing the advertising indicia on substantially all of the surface area of the edible substrate. The printing may be non-contact printing, high resolution printing, and/or inkjet printing. The printing may also further include printing the advertising indicia on a first surface and on an opposing second surface of the edible substrate.

[037] In an embodiment, the method may include replacing an opaque wrapper with the transparent wrapper.

[038] In an embodiment, a method for selling an edible product is provided. The method includes distributing an event product to a consumer. The event product includes an edible ink-indicia associated with an event on an edible substrate. The event may be a current event, a sports event, a holiday, a religious event, a political event, a seasonal event, a cultural event, a personal event, and combinations thereof.

[039] The distributing may occur at a time period selected from before the event, during the event, after the event, and combinations thereof. In an embodiment, the distributing may occur at the event. The distributing may also occur within about 24 hours of the event.

[040] In an embodiment, the method may include awaiting a result of the event and printing the result on the edible product. The result may be printed within about 1 second to about 24 hours after the occurrence of the result. In an embodiment, distribution of the event product may occur within about 1 minute to about 24 hours after the occurrence of the event and/or result.

[041] In an embodiment, a method of advertising is provided. The method includes distributing an event product advertisement to a consumer. The event product advertisement includes an edible substrate with an edible ink-indicia associated with an event on the edible substrate. An edible advertising indicia is also located on the edible substrate. The event may be any event as described above. Distribution of the event product advertisement may occur as described above. The edible ink-indicia and the edible advertising indicia may be inkjet indicia. The event product advertisement may include a three-dimensional object associated with the event.

[042] In an embodiment, an apparatus for producing an edible product is provided. The apparatus includes a dispensing device for spraying a molten gum base composition onto an edible substrate. The dispensing device may be in fluid communication with a source of the molten gum base composition, the source maintaining the gum base composition in a molten or liquefied state. The dispensing device may be a non-contact dispensing device such as an inkjet printing device or a valve-jet spraying device. The apparatus may also include a transport device for moving the edible substrate proximate to the dispensing device. In an embodiment,

the apparatus may include a controller in operative communication with the dispensing device. The controller may control the spraying process and the spray parameters of the molten gum base composition.

[043] In an embodiment, the apparatus may include a printing device. The printing device may print an edible ink-indicia on the edible substrate and/or the molten gum base composition. The printing device may be a non-contact printing device.

[044] In an embodiment, a confectionery product is provided. The confectionery product includes an edible substrate and a melted gum base composition adhered to the edible substrate. The edible substrate may be a confectionery, a coated confectionery, a chewing gum, a coated chewing gum, a center-filled chewing gum, a coated center-filled chewing gum, and combinations thereof. The melted gum base composition may be an elastomer, a resin, a softener, a wax, and combinations thereof. The melted gum base composition may also include one or more organoleptic components.

[045] In an embodiment, an edible ink-indicia may be located on the melted gum base composition and/or on the edible substrate. The edible ink-indicia may be an inkjet edible ink-indicia. The edible ink-indicia may include a feature. The feature may correspond to a property of the melted gum base composition and/or a property of the edible substrate.

[046] In an embodiment, the confectionery product may include a first melted gum base composition on a first portion of the edible substrate and a second melted gum base composition on a second portion of the edible substrate. The first melted gum base composition may contain one or more different ingredients than the ingredients of the second melted gum base composition.

[047] In an embodiment, the melted gum base composition forms an object on a surface of the edible substrate. The object may be a three-dimensional object on a surface of the edible substrate.

[048] In an embodiment, a further confectionery product is provided. The confectionery product may include a first layer of an edible substrate and a second layer of a melted gum base composition adhered to the first layer. The first layer may be substantially coextensive with the second layer. The confectionery product may

include a third layer of a melted gum base composition. The third layer may be adhered to the second layer or to the edible substrate.

~~[049] In an embodiment, the second layer may contain from about 30% to about 100% by weight of the melted gum base composition and from about 0% to about 70% by weight of one or more organoleptic components.~~

[050] In an embodiment, a method for producing a confectionery product is provided. The method includes spraying particles of a molten gum base composition onto a surface of an edible substrate and forming a multiple phase confectionery product. The molten gum base composition may form a layer on one or more surfaces of the edible substrate. In addition, a second layer of the molten gum base composition may be formed on the initial layer of the melted gum base composition.

[051] In an embodiment, the method includes forming the molten gum base composition into an object on the edible substrate surface. The object may be a three-dimensional object.

[052] In an embodiment, the method includes changing an ingredient of the molten gum base composition during the spraying. The method may also include dispensing an organoleptic component on the edible substrate. A component of the organoleptic component may also be changed as the molten gum base composition is sprayed onto the edible substrate.

[053] In an embodiment, the method includes spraying a first molten gum base composition on a first portion of the edible substrate and spraying a second molten gum base composition on a second portion of the edible substrate. One or more ingredients of the first molten gum base composition may be different than the ingredients of the second molten gum base composition.

[054] In an embodiment, the method may include dispensing an organoleptic component on the molten chewing gum base composition and/or onto the edible substrate.

[055] In an embodiment, the method may include printing an edible ink-indicia on the molten gum base composition and/or on the edible substrate.

[056] In an embodiment, a method for producing a chewing gum product is provided. The method includes providing a chewing gum substrate having a thickness that is less than a predetermined thickness and spraying a layer of a molten chewing

gum base composition on the chewing gum substrate to form a chewing gum product having the predetermined thickness. The spraying step may be repeated in order to obtain the predetermined thickness. The predetermined thickness may be the thickness of a chewing gum stick, the thickness of a chewing gum tab, or the thickness of a chewing gum pellet.

[057] In an embodiment, a confectionery product is provided. The confectionery product includes an edible substrate having a surface and an edible ink printed on the edible substrate. The edible ink may cover at least about 5% of the surface. Alternatively, the edible ink may cover at least about 50% of the surface. Further, the edible ink may cover at least about 75% of the surface. Similarly, the edible ink may cover about 100% of the surface. The edible ink may be multicolored. Further, only a single color of edible ink may be present on any portion of the surface of the edible substrate. The edible ink may be an inkjet ink.

[058] In an embodiment, the edible substrate may be a chewing gum stick, a chewing gum tablet, a chewing gum pellet, a coated chewing gum, a center-filled chewing gum, or combinations thereof. Further, the edible substrate may include chewing gum trim. The edible ink may mask any inconsistencies due to the presence of trim in the edible substrate.

[059] In another embodiment, the edible substrate has a first surface and an opposing second surface and the edible ink is printed on only the first surface. The edible ink may cover at least about 5% of the first surface of the edible substrate. Similarly, the edible ink may be printed on each of a first and a second surface of the edible substrate. The edible ink may cover at least about 5% of each of the first and the second surfaces of the edible substrate. Alternatively, the edible ink may cover at least about 50% of the first and the second surfaces of the edible substrate. Further, the edible ink may cover at least about 75% of the first and the second surfaces of the edible substrate. Similarly, the edible ink may cover about 100% of the first and second surfaces of the edible substrate.

[060] In an embodiment, a confectionery product is provided. The confectionery product includes an edible substrate having a body and first and second surfaces that are located on opposite sides of the edible substrate. The product further includes an edible ink printed on the edible substrate where the edible ink covers at

least about 5% of the first surface and does not extend through the body, and therefore is not visible on the second surface of the edible substrate. Alternatively, the edible ink may cover at least about 50% of the first surface and not extend through the body. Further, the edible ink may cover at least about 75% of the first surface and not extend through the body.

[061] In an embodiment, the edible ink may cover about 100% of the first and/or second surface of the edible substrate. Covering the entirety of one or both surfaces of the edible substrate gives the confectionery product the appearance of a co-extruded product. Covering all of one or both surfaces also permits trim material to be incorporated into the edible substrate as the edible ink may cover or mask any inconsistencies of the trim material. Further, in an embodiment, the trim material may produce an edible substrate with a first color. The color of the edible ink may be selected to be the same color as the edible substrate, the ink having a greater color concentration than the edible substrate. For example, the trim-containing edible substrate may be a light shade of red (or a pink) and the edible ink applied to the edible substrate may be a dark red color.

[062] In another embodiment, the edible ink is printed on the second surface of the edible substrate. The edible ink may be an inkjet ink. The edible ink may be printed on the edible substrate at a dot concentration from about 3600 dots per square inch to about 36,400 dots per square inch.

[063] In an embodiment, the edible substrate may be a chewing gum stick, a chewing gum tablet, a chewing gum pellet, a coated chewing gum, a center-filled chewing gum or combinations thereof. Further, the edible substrate may include trim material that is recycled back into a bulk mixer during manufacturing of the gum.

[064] In still yet another embodiment, a method for producing a confectionery product is provided. The method includes non-contact printing an edible ink onto a surface of an edible substrate to cover at least about 5% of the surface. The method may include covering at least about 50% of the surface with edible ink. The method may further include covering at least about 75% of the surface with the edible ink. The method may further include covering at least about 100% of the surface with the edible ink. The edible ink may be an inkjet ink.



[065] In an embodiment, the method includes non-contact printing a multiple color edible ink.

[066] In an embodiment, the method includes applying the edible ink at a dot concentration from about 3600 dots per square inch to about 36,400 dots per square inch. The method may also include the edible substrate traversing a printing device at least once.

[067] In an embodiment, the method includes allowing the edible ink to absorb partially through a body of the edible substrate to provide the edible substrate with a co-extruded appearance.

[068] In another embodiment, an apparatus is provided. The apparatus includes a removal device for removing at least a portion of a rolling compound from a confectionery material and a printing device for non-contact printing an edible ink-indicia on the confectionery material.

[069] In an embodiment, the apparatus may further include a transport device for moving the confectionery material under the printing device.

[070] In an embodiment, the printing device may be a spray device. Alternatively, the printing device may be an ink jet printing device.

[071] In an embodiment, the removal device may be a vacuum system, a brush device, a sponge device, and combinations thereof.

[072] In an embodiment, the apparatus may further include a detection device in operative communication with the printing device. In this embodiment, the printing device non-contact prints the edible ink-indicia on the confectionery material after the detection device detects the confectionery material at a predetermined position. The detection device may include at least one photoeye.

[073] In an embodiment, the confectionery material may be a chewing gum stick, a chewing gum tablet, a chewing gum pellet, a coated chewing gum, a center-filled chewing gum, and combinations thereof.

[074] In another embodiment, an apparatus is provided. The apparatus includes a transport device for moving a confectionery material to a predetermined position, a detection device detecting the presence of the confectionery material at the predetermined position, and a printing device in operative communication with the detection device. In this embodiment, the printing device non-contact prints

an edible ink-indicia on the confectionery material after the detection device detects the confectionery material at the predetermined position.

[075] In an embodiment, the apparatus may further include a removal device for removing at least a portion of a rolling compound from the confectionery material.

[076] In another embodiment, a method is provided for producing a confectionery product. The method includes removing a rolling compound from a confectionery material and non-contact printing an edible ink-indicia on the confectionery material. The method may include removing from about 80% to about 99% of the rolling compound from the confectionery material.

[077] In an embodiment, the removing is an act such as, for example, vacuuming the rolling compound from the confectionery material, brushing the rolling compound from the confectionery material, sponging the rolling compound from the confectionery material, and combinations thereof.

[078] In an embodiment, the method may further include non-contact printing the edible ink-indicia on the confectionery material when the ink-indicia is at the predetermined position.

[079] In another embodiment, a method is provided for producing a confectionery product. The method includes moving a confectionery material to a predetermined position, detecting the presence of the confectionery material at the predetermined position and non-contact printing an edible ink-indicia on the confectionery material.

[080] In an embodiment, the method includes removing a rolling compound from the confectionery material before the non-contact printing.

[081] In an embodiment, a method for producing a chewing gum product is provided. The method includes providing a consumer with the ability to select an organoleptic component and producing a chewing gum product with the organoleptic component after the consumer selection. The method further includes delivering the chewing gum product to the consumer. An Internet site may be provided to the consumer with a list of organoleptic components. The chewing gum product may be delivered to the consumer by way of mail or similar courier system.

[082] In an embodiment, the method includes dispensing the organoleptic component on a surface of the chewing gum product.

[083] In an embodiment, the method includes providing the consumer the ability select to an indicia, and producing the chewing gum with the indicia. The indicia may be printed with edible ink on a surface of the chewing gum product.

[084] In an embodiment, the method may include generating a list of organoleptic components in a computer-readable medium, receiving data that selects at least one of the organoleptic components, generating instruction data from the received data; and transmitting the instruction data to a dispensing device. The dispensing device may then dispense the organoleptic component onto a surface of an edible substrate based on the instruction data.

[085] In an embodiment, the received data may include indicia data, and the instruction data may include indicia data printing instructions. The method may further include transmitting the indicia data printing instructions to a printing device. The printing device may then print an edible ink-indicia on the surface of the edible substrate based on the indicia data printing instructions.

[086] In an embodiment, a method of generating revenue is provided. The method includes allowing a consumer to create a custom chewing gum by selecting an organoleptic component, and producing a chewing gum product with the selected organoleptic component. The method may further include allowing the consumer to select an indicia and producing the chewing gum product with the indicia. The method may also include paying a fee by the consumer, the fee based on the number of organoleptic components, the number indicia, the number of chewing gum products desired, and combinations thereof.

[087] It is an advantage of the present disclosure to provide an improved method for making chewing gum.

[088] It is an advantage of the present disclosure to provide an improved chewing gum.

[089] It is an advantage of the present disclosure to provide an apparatus for printing upon a comestible product.

[090] It is an advantage of the present disclosure to provide an apparatus for producing a printed comestible product whereby the printing device may be located anywhere along the apparatus and/or the production line.

[091] It is an advantage of the present disclosure to provide an edible ink, the composition of which may be adjusted based on the location of the printing device with respect to other components of the apparatus.

[092] It is an advantage of the present disclosure to provide an apparatus which enables printing upon multiple surfaces of an edible substrate.

[093] It is an advantage of the present disclosure to produce a printed comestible product with heightened consumer attractiveness in a simple and cost-effective manner.

[094] It is an advantage of the present disclosure to provide a comestible product that delivers a multiple sensory experience when consumed.

[095] It is an advantage of the present disclosure to provide a printed comestible which connects that which is printed on the comestible with the sensations experienced when the product is consumed.

[096] It is an advantage of the present disclosure to provide a printed comestible product with increased consumer attractiveness.

[097] It is an advantage of the present disclosure to provide improved advertising for edible products.

[098] It is an advantage of the present disclosure provide a product for distribution through new venues.

[099] It is an advantage of the present disclosure to distribute to consumers an edible product with time-sensitive information printed directly on the product.

[0100] It is an advantage of the present disclosure to provide a confectionery product with improved flavors, colors, and shapes.

[0101] It is an advantage of the present disclosure to provide a standard size chewing gum product which contains less chewing gum.

[0102] It is an advantage of the present disclosure to provide the capability to change the composition of a chewing gum product instantaneously during production.

[0103] It is an advantage of the present disclosure to add organoleptic components to a chewing gum product that cannot be added during the extrusion process of chewing gum production.

[0104] It is an advantage of the present disclosure to provide a multiple phase confectionery product.

[0105] It is an advantage of the present disclosure to provide a multiple layer confectionery product.

[0106] It is an advantage of the present disclosure to provide a confectionery product having the appearance of a co-extruded confectionery product.

[0107] An advantage of the present disclosure is to provide confectionery products printed with edible ink where the edible ink does not bleed-through the product.

[0108] Another advantage of the present disclosure is to provide aesthetically appealing confectionery products.

[0109] Another advantage of the present disclosure is to provide confectionery products that appear multi-layered or co-extruded.

[0110] Another advantage of the present disclosure is to provide a confectionery product including trim material in the edible substrate.

[0111] A further advantage of the present disclosure is to provide a substantially flat stick of chewing gum having edible ink printed thereon.

[0112] Another advantage of the present disclosure is to provide an apparatus for non-contact printing an edible ink with improved adherence on confectionery products.

[0113] Another advantage of the present disclosure is to provide an improved method and apparatus for detecting defects in confectionery products.

[0114] A further advantage of the present disclosure is to provide high quality edible ink-indicia by removing rolling compound from confectionery material prior to non-contact printing the edible ink-indicia.

[0115] An advantage of the present disclosure is a method for producing a customized chewing gum product.

[0116] Additional features and advantages are described herein, and will be apparent from, the following Detailed Description and the Figures.

#### BRIEF DESCRIPTION OF THE FIGURES

[0117] Figure 1 is a schematic representation of an apparatus of the present disclosure.

[0118] Figure 1A is a perspective view of a printing device of the present disclosure.

[0119] Figure 2 is a perspective view of a printing device printing on an edible substrate of the present disclosure.

[0120] Figure 3 is a perspective view of a printing device printing on an edible substrate of the present disclosure.

[0121] Figure 4 is a perspective view of a printing device printing on an edible substrate of the present disclosure.

[0122] Figure 5 is a perspective view of a printing device printing on an edible substrate of the present disclosure.

[0123] Figure 6 is a perspective view of a printing device printing on an edible substrate of the present disclosure.

[0124] Figure 6A is a perspective view of a printing device printing on an edible substrate of the present disclosure.

[0125] Figure 7 is a perspective view of a printing device printing on an edible substrate of the present disclosure.

[0126] Figure 8 is a perspective view of an edible product of the present disclosure.

[0127] Figure 9 is a perspective view of a printed edible product in a packaging of the present disclosure.

[0128] Figure 10 is a perspective view of a printing device printing on an edible substrate of the present disclosure.

[0129] Figure 11 is a perspective view of an edible product and a packaging of the present disclosure.

[0130] Figure 12 is a perspective view of a printing device printing and an edible substrate of the present disclosure.

[0131] Figures 13A, 13B, and 13C each are a perspective view of an apparatus dispensing an edible material onto an edible substrate of the present disclosure.

[0132] Figures 14A and 14B are each a perspective view of an apparatus dispensing an edible material onto an edible substrate of the present disclosure.

[0133] Figure 14C is a perspective view of a dispensing device and an edible substrate of the present disclosure.

[0134] Figure 14D is a perspective view of a confectionery product of the present disclosure.

[0135] Figure 14E is a perspective view of a confectionery product of the present disclosure.

[0136] Figure 14F is a perspective view of a chewing gum product.

[0137] Figure 14G is a perspective view of a chewing gum substrate of the present disclosure.

[0138] Figure 14H is a perspective view of chewing gum product of the present disclosure.

[0139] Figure 15A is top perspective view of an event product of the present disclosure.

[0140] Figure 15B is a bottom perspective view of the event product of Figure 15A.

[0141] Figure 16 is a perspective view of an event product of the present disclosure.

[0142] Figure 17A is a top perspective view of an event product advertisement of the present disclosure.

[0143] Figure 17B is a bottom perspective view of the event product advertisement of Figure 17A.

[0144] Figure 18 is a perspective view of a printing device and an edible substrate of the present disclosure.

[0145] Figure 19 is a perspective view of a confectionery product having an edible ink printed thereon of the present disclosure.

[0146] Figure 20 is a perspective view of a confectionery product having an edible ink printed thereon of the present disclosure.

[0147] Figure 21 is a perspective view of a confectionery product printed with an edible ink of the present disclosure.

[0148] Figure 22 is perspective view of a confectionery product printed with an edible ink of the present disclosure.

[0149] Figure 23 is perspective view of a confectionery product printed with an edible ink of the present disclosure.

[0150] Figure 24 is a perspective view of an apparatus for printing an edible ink on a confectionery product of the present disclosure.

[0151] Figure 25 is a perspective view of an apparatus for printing an edible ink on a confectionery product of the present disclosure.

[0152] Figure 26 is a perspective view of an apparatus for printing an edible ink on a confectionery product of the present disclosure.

[0153] Figure 27 is a perspective view of an apparatus for printing an edible ink on a confectionery product of the present disclosure.

#### DETAILED DESCRIPTION

[0154] The present disclosure relates to an apparatus for producing a printed product. Referring to the Figures generally, and in particular to Figure 1, a schematic view of apparatus 10 for producing a printed comestible is shown. Apparatus 10 may be a system for the continuous production of an edible product. Extruder 12 extrudes a slab 14 of an edible substrate onto a conveyor 16. It is understood that the apparatus 10 may include one or more transport devices (or conveyors) to move the slab 14 to different locations within the system. The slab 14 may be any mass of an edible material capable of being extruded for conveyance in the manufacturing process. Nonlimiting examples of suitable materials for the slab 14 include confectionery materials and farinaceous foods. The slab 14 may be continuous or non-continuous. The slab 14 may have any nonlimiting shape or geometric form such as a rope, a sheet, a strand with any desired thickness as is commonly known in the art. As used herein, “edible” product or an “edible” substrate is a composition that is suitable for consumption and is non-toxic. An edible material may also be a material that complies with applicable standards such as food, drug, cosmetic (FD&C) regulations in the United States and/or Eurocontrol experimental center (E.E.C.) standards in the European Union. Nonlimiting examples of suitable edible substrates include confectionery materials, farinaceous foods such as cereals and pasta, extruded snacks such as crackers and snack chips, marshmallows, pastries, pet food, cereals, sausage, frozen dairy products, and cheese.

[0155] In an embodiment, the edible substrate may be a confectionery material. The confectionery material may be any hard candy, soft candy, chewy candy, chewing gum, or other confectionery substance, or compound that has a fluid phase or may take a flowable form. In other words, the confectionery material may be any material that may be heated, melted, dissolved melted, form a syrup, or be dissolved in a liquid to



become flowable as is commonly known in the art. The skilled artisan will appreciate that the moisture content (and concomitant viscosity) of the confectionery material may vary greatly. The moisture content of the flowable phase of the confectionery substrate may typically be in the range of about 0.5% to about 20% by weight of the confectionery material. The flowable confectionery material may be subsequently cooled or solidified at room temperature to form a solid or semi-solid confectionery. Nonlimiting examples of suitable confectionery materials that are flowable or may be placed into a flowable state include syrups, liquids or solids for making hard candies, soft candies, lollipops, fondants, toffees, jellies, chewing gums, chocolates, gelatins and nougats. The confectionery material may include sugar or may be sugar-free. Coloring may be added to the confectionery substrate as desired. The confectionery material may also include a pharmaceutical product or a medicament. In an embodiment, the slab 14 may be a chewing gum.

[0156] In an embodiment, slab 14 may be a center-filled extrudate. Nonlimiting examples of suitable center fill materials include any liquid, syrup, paste, colloid, or solid edible material. In an embodiment, slab 14 may be a confectionery material with a fill material such as boiled candy, hard candy, soft candy, toffee, jelly, syrup, paste, chewing gum, bubble gum, chocolate, gelatin, caramel, taffy, nougat, granular candy, and combinations thereof. In a further embodiment, the slab 14 may be a confectionery material having a chewing gum outer portion and an inner portion of any of the aforementioned center fill materials.

[0157] Depending on the composition of the confectionery material, apparatus 10 may or may not include a dusting device 18 and/or a dusting compound. For example, apparatus 10 may not include a dusting device when the slab 14 is a soft candy or a chewing gum. In an embodiment, apparatus 10 may include dusting device 18 when slab 14 is a chewing gum material. Dusting device 18 may disperse a dusting compound (such as talc, sugar, or starch) upon slab 14 to reduce adhesiveness between the slab and apparatus components. In a further embodiment, a minimal amount of dusting compound may be applied to slab 14 in order to improve print quality.

[0158] In an embodiment, the apparatus 10 may include a spreading device to uniformly distribute the dusting compound on the slab 14. Nonlimiting examples of suitable spreading devices include physical brushes, air brushes, a blade, and any

device that uniformly distributes the dusting compound on the slab 14. Uniform distribution of the dusting compound promotes reception of an ink composition by the slab 14 as will be discussed below.

[0159] Rollers 20 may be used to size or otherwise thin slab 14 to any dimension as desired. In an embodiment, rollers 20 may size slab 14 into a flat or substantially flat sheet of confectionery material. In a further embodiment, the sheet may have a thickness from about 0.058 inches to about 0.062 inches, or about 0.060 inches. In yet a further embodiment, slab 14 may be extruded chewing gum in the form of a thick slab which may be reduced to a sheet of any desired thickness by way of one or more calander rolls. Once the desired thickness is achieved, the slab may be printed, scored, partially scored, and/or cut into final product dimensions. Alternatively, slab 14 may be sized to form pellet-shaped or tab-shaped confectionery pieces.

[0160] After rollers 20 size slab 14 to the desired thickness, the rolled confectionery material may be cut and/or scored by cutting device 22. Cutting device 22 may form individual confectionery pieces directly from the slab of confectionery material 14a. Alternatively, cutting device 22 (such as a scoring device) may cut large sheets of confectionery material which may be subsequently scored to form individual confectionery pieces 24. In a further embodiment, the pieces 24 may be sealed center-filled confectionery pieces formed from a center-filled confectionery rope. Pieces 24 may proceed to a cooling device 26 and onto further processing such as to a curing chamber 28, and optionally a coating device 30 whereupon coated confectionery pieces 24a are formed. Uncoated or coated individual confectionery pieces 24, 24a may proceed to a packaging machine as is commonly known in the art.

[0161] As shown in Figure 1A, apparatus 10 further includes a printing device 32 for printing an ink composition onto either the continuous slab 14, continuous supply of individual confectionery pieces 24, or coated confectionery pieces 24a. In an embodiment, printing device 32 may be any non-contact printing device as is commonly known in the art. As used herein, "non-contact printing" is the application of an ink composition to a substrate without the printing device touching a surface of the substrate to which the ink is applied. A non-contact printing device applies or dispenses an ink composition directly to the substrate without any intermediate

structures between the printing device and the substrate. Non-contact printing may include spraying, dispensing, or otherwise applying an ink composition to one or more surfaces of the substrate. Thus, no part of the non-contact printing device touches the surface of the edible substrate such as slab 14 and/or pieces 24, 24a.

[0162] In a further embodiment, printing device 32 may be an ink jet printing device. Ink jet printers typically entail a print head in fluid communication with one or more ink reservoirs, the print head adapted for ink-jetable printing. In ink jet printing, the print head ejects or otherwise “jets” fine droplets of ink from the reservoir onto a receiving substrate. It is understood that printing device 32 may be configured to dispense or jet ink compositions or other fluids therefrom. Indeed, any jettable fluid may be dispensed from printing device 32. A “jettable” fluid or material may be any material (solid or liquid) that has properties sufficient to allow the material to be selectively deposited by an ink jet material dispenser as is commonly known in the art. Ink jet printing is advantageous, particularly with respect to comestibles as it provides 1) high resolution printing and 2) non-contact with the comestible thereby avoiding the risk of damage to the comestible item. Non-limiting examples of suitable non-contact printing devices include ink jet printing systems such as thermally actuated ink jet dispensers, mechanically actuated ink jet dispensers, electrostatically actuated ink jet dispensers, magnetically actuated ink jet dispensers, continuous ink jet printers, drop-on-demand (also called “impulse”) ink jet printers, and acoustic ink jet systems.

[0163] In continuous inkjet systems, ink is emitted in a continuous stream under pressure through at least one nozzle. The stream is broken up into droplets by applying vibration or pressure pulses to the ink. This can be achieved by vibrating the nozzle or the nozzle assembly by means of a piezoelectric crystal, or by immersing a vibration probe, for example a piezoelectric crystal rod, in the ink itself. Typically, the ink droplets in continuous ink-jet systems are formed by a piezoelectric crystal, which is vibrated at controlled frequency adjacent to the ink stream. To control the flow of ink droplets, the ink is charged by applying a voltage between the ink jet before it breaks up into droplets and a charge electrode, so that each droplet carries a known charge. The charged droplets then pass through a deflection electric field where they are deflected from their straight line of flight by the deflection field applied. The extent of deflection will determine the point at which the droplets strike a substrate passing

the printer and the charge and/or deflection fields are varied to direct the droplets to the desired location on the substrate. Droplets which are not to be printed are not deflected but are caught in a catcher or gutter and are returned to the ink reservoir for re-use.

[0164] Drop-on-demand jet systems, include piezojet and bubblejet (sometimes referred to as thermal ink-jet) systems. In bubblejet systems, a bubble is formed by a resistance heater in an ink reservoir. The resulting pressure wave from the bubble forces ink through the orifice plate, and as the heat is removed, the bubble begins to collapse and a droplet is ejected. Alternatively, the drop-on-demand system may form discrete droplets of ink which are ejected from an array of nozzles past which the substrate passes, the nozzles being activated at the desired frequency and in the desired order to form the desired image on the substrate. Thus, the printer may be one in which ink under pressure flows to the nozzles via valving means which are actuated under the control of a computer or the like to allow ink to flow to the required nozzle to eject a droplet from that nozzle.

[0165] In acoustic ink jet printing, one or more acoustic beams emanating from one or more acoustic radiators for illuminating the free surface of a pool of liquid ink with respective acoustic beams. Each of these beams usually is brought to focus at or near the surface of the reservoir (i.e., the liquid/air interface). Furthermore, printing conventionally is performed by independently modulating the excitation of the acoustic radiators in accordance with the input data samples for the image that is to be printed. This modulation enables the radiation pressure which each of the beams exerts against the free ink surface to make brief, controlled excursions to a sufficiently high pressure level for overcoming the restraining force of surface tension. That, in turn, causes individual droplets of ink to be ejected from the free ink surface on demand at an adequate velocity to cause them to deposit in an image configuration on a nearby recording medium. The acoustic beam may be intensity modulated or focused/defocused to control the ejection timing, or an external source may be used to extract droplets from the acoustically excited liquid on the surface of the pool on demand. Regardless of the timing mechanism employed, the size of the ejected droplets is determined by the waist diameter of the focused acoustic beam. Acoustic ink printing is attractive because it does not require small nozzles or small ejection

orifices. The size of the ejection orifice is an important design parameter of an ink jet because it determines the size of the droplets of ink that the jet ejects. Acoustic printing has increased intrinsic reliability because there are no nozzles to clog. As will be appreciated, the elimination of the clogged nozzle failure mode is especially relevant to the reliability of large arrays of ink ejectors, such as arrays comprising several thousand separate ejectors. Furthermore, small ejection orifices are avoided, so acoustic printing can be performed with a large variety of inks, including inks having higher viscosities and inks containing pigments and other particulate components.

[0166] Printing device 32 may include one or more jetting heads 34 in fluid communication with one or more reservoirs 36 by way of channel 35 as shown in Figure 1A. In an embodiment, reservoirs 36 may contain ink components so that printing device may deliver an ink or ink composition to the continuous slab, the individual pieces, or the coated pieces. In an embodiment, printing device 32 may be configured with four reservoirs, each reservoir containing edible ink compositions in typical colors such as cyan, magenta, yellow, and black or white in order to provide multiple color images. Printing device 32 may be configured with more or less reservoirs for more or less colors as desired. Each jetting head 34 may include one or more nozzles as is commonly known in the art. For example jetting head 34 may include from 1 to 10, 50, 100, 500, 1000, or 5,000 or more individual nozzles or jets. Each jetting head 34 may be in fluid communication with one or more fluid reservoirs 36. Jetting heads 34 may be arranged in any desired manner to deliver an ink composition onto continuous slab 14, 14a, pieces 24 and/or coated pieces 24a. For example, jetting heads 34 may be arranged in a single line. Alternatively, jetting heads 34 may be arranged in a series of lines to form a matrix-type printing profile.

[0167] The ink composition may be any water-based ink, solvent-based ink, wax-based ink, absorbing ink, pigment-containing, or non-pigment containing edible ink as is commonly known in the art. A water-based ink may be considered an ink that contains more water than non-aqueous solvent. Water-based inks typically include water, a pigment, a dispersant (such as a polyol) for the pigment, and may contain one or more non-aqueous solvents (such as one or more alcohols) and a dye. In an embodiment, the ink composition may be a water-based pigmented ink having about 30% to about 85% by weight water, a pigment in an amount from about 3% to about

45% by weight of the ink, a dispersant, such as glycerine, polypropylene glycol, or polyethylene glycol in an amount from about 1.0% to about 50% by weight. In an embodiment, the water-based pigmented inks may contain one or more dyes in an amount from about 100 ppm to about 2% by weight.

[0168] In an embodiment, the ink composition may be a solvent-based ink composition. A solvent-based ink composition may be considered an ink composition having more non-aqueous solvent than water. Solvent-based ink compositions may be either pigmented or non-pigmented and may be fat- or oil- based. Solvent-based inks typically include an organic solvent (ketone, alkanol, alkyl acetate, alkyl ester, alkyl-carboxylic acid) which permits the ink to adhere firmly to the substrate, the solvent drying rapidly so that the printed ink resists smudging or smearing allowing the printed substrate to be handled almost immediately after printing. The organic solvent readily dissolves the dye/pigment, providing a wide range of ink compositions to be used with the printing device. In an embodiment, the solvent-based ink composition may be pigmented and have a non-aqueous solvent such as glycerine, polypropylene glycol, or polyethylene glycol present in a range from about 15% to about 80% by weight, water present in a range from about 1% to about 20% by weight, and pigment present in an amount from about 5% to about 50% by weight.

[0169] In an embodiment, the edible ink may be an absorbing ink. An absorbing ink typically includes water, a pigment, a dispersant (such as a polyol) for the pigment, and may contain one or more non-aqueous solvents (such as one or more alcohols) and a dye. In an embodiment, the absorbing ink may be a water-based pigmented ink having about 30% to about 85% by weight water, a pigment in an amount from about 3% to about 45% by weight of the ink, a dispersant, such as glycerine, polypropylene glycol, or polyethylene glycol in an amount from about 1.0% to about 50% by weight. In an embodiment, the water-based pigmented inks may contain one or more dyes in an amount from about 100 ppm to about 2% by weight.

[0170] A nonlimiting example of an absorbing ink is a propylene glycol-based ink. Propylene glycol, known also as propane-1,2-diol, is usually a tasteless, clear, oily liquid that is hygroscopic and miscible with water, acetone, and chloroform. It is widely used in food applications because of its low toxicity, absence of colour and odor, excellent solvent characteristics and good emollient properties. Propylene glycol

can also serve as a carrier for active ingredients and solvent in colors, emulsifiers, antioxidants and enzymes.

[0171] In an embodiment, the absorbing ink may contain propylene glycol, glycerine, water, one or more dyes, a stabilizing agent such as a polyglycerol ester, and a base such as sodium hydroxide. The propylene glycol may be present in an amount from about 5-95% by weight of the absorbing ink or any value therebetween. The glycerine may be present in an amount from about 5-95% by weight of the absorbing ink, or any value therebetween. The dye may be present from about 0.5% to about 5% by weight of the absorbing ink or any value therebetween. In an embodiment, the absorbing ink may contain about 45% by weight glycerine and about 55% by weight propylene glycol. One of ordinary skill in the art will appreciate that the ratio of propylene glycol to glycerine may be varied in order to increase/decrease the amount of dye dissolved in or otherwise dispersed within the absorbing ink.

[0172] In an embodiment, the ink composition may be a wax-based edible ink (also known as a hot-melt edible ink). A wax-based-ink may include a dye dispersed or dissolved in a fat, wax, or oil. The wax may include any food grade wax, including such nonlimiting examples as microcrystalline wax, paraffin, and natural or synthetic wax. In a further embodiment, the wax-based edible ink may include from about 3% to about 6% by weight of an edible dye, from about 10% to about 20% by weight of hydrogenated resins, and from about 74% to about 87% by weight of a wax such as candela wax, carnauba wax, microcrystalline wax, and combinations thereof.

[0173] The edible ink composition may contain a food grade dye or lake wherein specified amounts of the dye/lake may be ingested by a human without generally causing deleterious health effects. Examples of food grade compounds include those compounds "generally recognized as safe" ("GRAS") by the United States Food and Drug Administration ("FDA") and colorants approved by the FDA for use in foods for human consumption. The food grade dyes used to produce the colored fluids may include synthetic dyes, natural dyes, or combinations thereof. As used herein, the term "dye" denotes dyes which are soluble in water and/or in the other cosolvents, which contain substantial amounts of glycols and/or glycerine, employed in the present colored fluids. Nonlimiting examples of suitable synthetic dyes include food grade Pontamine, Food Black 2, FD&C-Red #3, FD&C-Red #33, FD&C-Red

#40, FD&C-Blue #1, FD&C-Blue #2, FD&C-Yellow #10, FD&C-Yellow #5, FD&C-Yellow #6, and FD&C-Green #3. FD&C dyes that may be used include Red No. 3 (Erythrosine), Red No. 40 (Allura Red), Yellow No. 6 (Sunset Yel. FCF), Yellow No. 5 (Tartrazine), Green No. 3 (Fast Green FCF), Blue No. 1 (Brilliant Blue FCF), Blue No. 2 (Indigotine), and mixtures thereof. Suitable natural dyes include turmeric oleoresins, cochineal extracts, gardenia extracts, and natural colors derived from vegetable juices. Other nonlimiting examples of suitable natural dyes include beet extract, grape skin extract, and chlorophyll containing extracts (e.g. nettle extract, alfalfa extract and spinach extract). To achieve a desired color tint or shade, the colored liquids may include mixtures of more than one synthetic and/or natural food grade dye. In a typical embodiment, the colored fluids contain about 0.1 to 10 wt. % food grade dye on a dissolved solids basis.

[0174] In an embodiment, the ink composition may include additives such as flavorings, preservatives, antifoam agents, micronutrients, dispersion stabilizers, film formers, binders, a surface tension modifier, a thickening agent, an antioxidant, a preservative, a buffering agent, and/or an antimicrobial agent as commonly known the art. The ink composition may also include adhesion enhancers such as a surfactant or a film forming resin. The surfactant may be cationic, anionic, or amphoteric and may include such nonlimiting examples as polyglycerol oleate, monostearate, polysorbate, mono and diglyceride, and a phospholipids such as lecithin. Nonlimiting examples of suitable film forming resins may include such edible resins as acrylic co-polymers, rosin esters, shellac, polyvinyl esters, ketone resins, urea aldehyde resins, vinyl chloride/vinyl ether or vinyl acetate co-polymers, cellulose ethers and esters, polyamide resins, styrene/maleate resins, polyvinylpyrrolidone resins, vinyl pyrrolidone/vinyl acetate co-polymers, polystyrene resins, melamine resins, thermosetting acrylic resins, polyurethane resins and radiation curable acrylate resins. The ink composition may also include an organoleptic component and/or an active agent as will be described in detail below.

[0175] It is understood that the ink composition may be compatible with the printing device so as not to damage the jetting head components or cause inconsistent firing of jets. The ink composition may also be compatible with the edible substrate to



provide a high resolution ink-indicia that adheres to the edible substrate surface. In an embodiment, the ink is a solid or in a solid state at ambient temperature.

[0176] Printing device 32 may be placed anywhere along apparatus 10 to print, dispense, place, jet, spray, or otherwise selectively eject an amount of the edible ink onto all or discrete portions of slab 14, 14a, confectionery pieces 24 or coated confectionery pieces 24a. In an embodiment, the edible ink may form an ink-indicia as discussed more fully below. Printing device 32 may be a single pass or a multiple pass printing device to form a single-color or a multiple-color image on the substrate. Alternatively, the printing device 32 may be stationary and the slab 14 may move on a transport device as the edible ink is dispensed on the slab 14. For example, printing device 32 may be placed at location A to print an ink-indicia onto slab of edible substrate 14 downstream of extruder 12 and upstream of dusting device 18. Location A may be advantageous as contact between the ink composition and the slab 14 is not impeded by the presence of the dusting compound. Moreover, printing at location A may be beneficial as slab 14 is typically at an elevated temperature when exiting extruder 12. The elevated temperature of slab 14 may promote rapid drying of the ink composition and/or absorption of the edible ink onto the slab.

[0177] In an embodiment, printing device 32 may be placed at location B, downstream of dusting device 18 and upstream of rollers 20. When printing device 32 is positioned at location B, a fast-drying, strong adherent ink may be used. Location B may be advantageous when distortion of the ink-indicia by rollers 20 is desired or non-detrimental to the finished printed comestible product. Location B may also be utilized when high resolution of the ink-indicia is not required. For example, the ink-indicia may be a strip, a streak or a geometric shape such as one or more lines, parallel lines, a circle, or polka dots, or an indicia that does not lose shape and/or definition when expanded by sizing rollers 20. A spreading device may be located downstream of the dusting device 18 to ensure uniform spreading of the dusting compound and the elimination of any chunks or clusters of the dusting compound.

[0178] In an embodiment, printing device 32 may be placed at location C, downstream of rollers 20 and upstream of cutting device 22. Printing device 32 may also be placed at location D, downstream of cutting device 22 and upstream of cooling device 26. At location D, downstream of cutting device 22 and upstream of cooling

device 26, multiple sheets and/or multiple individual pieces may be printed with an ink-indicia using printing device 32. Location D may be advantageous as continuous individual pieces 24 may be at an elevated temperature prior to entering cooling device 26. The elevated temperature of pieces 24 may promote 1) drying of the ink composition and/or 2) adhesion of the ink composition to the edible substrate surface and/or absorption of the edible ink by the edible substrate.

[0179] In an embodiment, placement of printing device 32 at location E, downstream of cooling device 26 and upstream of curing chamber 28, may be utilized when printing upon a hard or firm surface of the edible substrate is desired. Location E may be advantageous when a slow-drying ink is used or when absorption of the ink is not desired. In an embodiment, apparatus 10 may include first and second printing devices. The first printing device may be located or otherwise disposed on a first side of the continuous supply of confectionery pieces 24 as denoted by E. The second printing device may be disposed on another side of the supply of pieces 24 as denoted by E'. In this configuration, first and second printing devices may print the edible ink composition onto opposing sides of pieces 24. The printing devices may be arranged in a top/bottom relationship. Alternatively, the printing devices may be arranged in a first side/second side relationship, such as first printing device on the left side of pieces 24 and second printing device on the right side of pieces 24. The first and second printing devices may deliver substantially simultaneously, the ink composition to opposing sides of the pieces. It is understood that multiple printing devices may be utilized anywhere along apparatus 10 to deliver ink composition to opposing sides of slab 14, pieces 24 or coated pieces 24a.

[0180] In an embodiment, printing device 32 may also be positioned at location F, downstream of coating device 30. At location F, the ink may include an adhesion enhancer, such as a wax for example, to promote adhesion with the coating surface of the coated comestible. In a further embodiment, printing device 32 may be positioned anywhere along or upon the packaging machine as desired. In an embodiment, the packaging device may be a blister pack packaging device with the printing device 32 printing an edible ink indicia on the edible substrates as they are fed into the blisters or when the edible substrates are already placed in the blisters. The individual pieces of the edible substrate may be printed upon and packaged so that the

edible ink of each piece is visible through the blister package. As herein described, the contents of the ink composition and/or the printing device may be modified as necessary depending on the placement of the printing device along apparatus 10.

[0181] In an embodiment, the composition of the edible ink may be adjusted based on the location of the printing device 32 with respect to the other components of the apparatus 10. For example, when the printing device 32 is at location A or B, it may be beneficial to use an edible solvent-based ink for rapid drying of the ink. When the printing device 32 is at location C, an absorbing ink may be used whereby such a location of the printing device permits absorption of the edible ink into the edible substrate. When the printing device 32 is at location F, a wax-based ink may be used to promote adhesion between the coating of the edible substrate and the edible ink.

[0182] In an embodiment, an edible product is provided. The edible product includes an edible substrate and an edible ink-indicia printed on the edible substrate. The edible product also includes an organoleptic component which corresponds to a feature of the edible product. In other words, the organoleptic component may be any sensory component that may be associated with, or coordinated with the feature. In particular, the organoleptic component may be any sensory-perceived component that typically accompanies, is associated with, complements, emphasizes, accentuates, highlights, matches, relates to, is in accord with, links with, or is connected to the feature.

[0183] The edible substrate may be any material suitable for consumption as previously described herein. In an embodiment, the edible substrate may be a confectionery product, a coated confectionery product, a chewing gum (in pellet, tablet or stick form), a coated chewing gum (in pellet, tablet, or stick form), a center-filled chewing gum, a coated center-filled chewing gum, and combinations thereof. In a further embodiment, the edible substrate may be formed by the apparatus 10.

[0184] As used herein, "ink-indicia" (or an "edible ink-indicia") is an ink mark or an ink indication on the edible substrate (or on the slab). Ink-indicia 54 may be any single color or multiple color edible ink or ink composition as discussed herein. Moreover, ink-indicia 54 may depict any symbol, object, alpha-numeric representation, letter, word, text, shape, fanciful shape, image, graphic, color, advertising indicia, or combination thereof as desired. Nonlimiting examples of

suitable ink-indicia include images, photographs or pictures of people, characters, scenes, or landscapes; advertising indicia such as brand names, trade names, logos, trademarks, text slogans; a processing code such as a bar code; words; objects; or any combination thereof. In an embodiment, ink-indicia 54 may be an inkjet-indicia.

[0185] As used herein, “feature” is a property of the edible substrate, a characteristic of the edible ink-indicia, and combinations thereof. Nonlimiting examples of properties for the edible substrate include the structure of the edible substrate (single layer, multiple layer, center-filled, coated, uncoated, co-deposited, coextruded), the composition of the edible substrate, an ingredient in the edible substrate, the surface texture of the edible substrate (flat, substantially flat, convex, concave, curved, smooth, rough, wavy, contoured, irregular, jagged, indentations, protrusions), the hardness of the edible substrate (hard, soft, chewy, pliable), and combinations thereof.

[0186] In an embodiment, printing device 32 may be used to form an edible product 50 as shown in Figure 2. Edible product 50 may include an edible substrate 52 and an edible ink-indicia 54 formed from ink composition 53 printed from printing device 32 and onto the substrate 52. Ink-indicia 54 may include a feature 56. Printing device 32 may also dispense an organoleptic component 58 corresponding to feature 56 of ink-indicia 54. Consequently, edible product 50 may include an ink-indicia 54 with a feature 56 and an organoleptic component 58 corresponding to the feature.

[0187] In an embodiment, edible substrate 52 may be any edible comestible, material, or substrate as previously discussed herein. Edible substrate 52 may have planar surfaces, non-planar surfaces, or a combination of planar and non-planar surfaces. Edible substrate 52 may have a flat, a curved, a wavy, a convex (i.e., pellet, tablet, or bean-shaped), or a concave surface contour. The edible substrate may be coated or uncoated. In an embodiment, edible substrate 52 may be a confectionery material, such as a substantially flat stick of chewing gum as shown in Figure 2.

[0188] The organoleptic component may be any component that is perceptible by the senses. Thus, the organoleptic component may be any component that may be perceived or detected visually (i.e., color, texture), by touch (i.e., contact by hand, tongue, or mouthfeel), audibly (sound), by taste, and/or by smell (aromatic). Nonlimiting examples of suitable organoleptic components include flavoring agents,

cooling agents, heating agents (or warming agents), mouthfeel agents (any component with a rough, fizz, or particulate texture), tingling agents, sweetening agents, souring agents, bittering agents, teeth whitening agents, anti-cavity agents, breath freshening agents, audible agents (a cracking, fizzing, or popping component), and combinations thereof.

[0189] The flavoring agent may be a natural flavor, a nature identical flavor, an artificial flavor, and combinations thereof. Nonlimiting examples of flavoring agents include almond, amaretto, apple, green apple, apple-cherry-berry, apple-honey, apricot, bacon, balls of fire, banana, barbeque, beef, roast beef, beef steak, berry, berry blue, birch beer/spruce beer, blackberry, bloody mary, blueberry, boysenberry, brandy, bubble gum, butter, butter pecan, buttermilk, butterscotch, candy corn, cantaloupe, cantaloupe lime, caramel, carrot, cassia, caviar, celery, cereal, champagne, cherry, cherry cola, cherry maraschino, wild cherry, black cherry, red cherry, cherry-cola, chicken, chocolate, chocolate almond, cinnamon spice, citrus, citrus blend, citrus-strawberry, clam, cocoa, coconut, toasted coconut, coffee, coffee almond, cola, cola-vanilla, cookies & cream, cool, cotton candy, cranberry, cranberry-raspberry, cream, cream soda, dairy type cream, crème de menthe, cucumber, black currant, dulce de leche, egg nog, pork fat, type fat, anchovy fish, herring fish, sardine fish, frankfurter, fiery hot, fried garlic, sautéed garlic, gin, ginger ale, ginger beer, graham cracker type, grape, grape grapefruit, grapefruit-lemon, grapefruit-lime, grenadine, grill, guarana, guava, hazelnut, honey, hot, roasted honey, ice cream cone, jalapeno, key lime, kiwi, kiwi -banana, kiwi- lemon-lime, kiwi-strawberry, kola champagne, lard type, lemon, lemon custard, lemonade, pink lemonade, lemon-lime, lime, malt, malted milk, mango, mango-pineapple, maple, margarita, marshmallow, meat type, condensed milk, cooked milk, mint, mirepoix, mocha, mochacina, molasses, mushroom, sautéed mushroom, muskmelon, nectarine, neopolitan, green onion, sautéed onion, orange, orange cordial, orange creamsicle, orange creme, orange peach mango, orange strawberry banana, creamy orange, mandarin orange, orange-passion- guava, orange-pineapple, papaya, passion fruit, peach, peach-mango, peanut, roasted peanut, pear, pecan danish type, pecan praline, pepper, peppermint, pimento, pina colada, pina colada/pineapple-coconut, pineapple, pineapple-orange, pistachio, pizza, pomegranate, pork fat type, baked potato, prune, punch, citrus punch, tropical punch, cherry fruit punch, grape

punch, raspberry, black raspberry, blue raspberry, red raspberry, raspberry-blackberry, raspberry-ginger ale, raspberry-lime, roast type, root beer, rum, sangria, sarsaparilla, sassafras, sausage, sausage pizza, savory, seafood, shrimp, hickory smoke, mesquite smoke, sour, sour cream, sour cream and onion, spearmint, spicy, strawberry, strawberry margarita, jam type strawberry, strawberry-kiwi, burnt sugar, sweet, supersweet, sweet & sour, tallow, tamarind, tangerine-lime, tangerine, tea, tequila type, toffee, triple sec, tropical fruit mix, turkey, tutti frutti, vanilla, vanilla cream, vanilla custard, french vanilla, vegetable, vermouthe, vinegar, balsamic vinegar, watermelon, whiskey, wildberry, wine, yogurt, and combinations thereof.

[0190] Nonlimiting examples of cooling agents include xylitol, erythritol, dextrose, sorbitol, menthane, menthone, ketals, menthone ketals, menthone glycerol ketals, substituted p-menthanes, acyclic carboxamides, mono menthyl glutarate, substituted cyclohexanamides, substituted cyclohexane carboxamides, substituted ureas and sulfonamides, substituted menthanols, hydroxymethyl and hydroxymethyl derivatives of p-menthane, 2-mercapto-cyclo-decanone, hydroxycarboxylic acids with 2-6 carbon atoms, cyclohexanamides, menthyl acetate, menthyl salicylate, N,2,3-trimethyl-2-isopropyl butanamide (WS-23), N-ethyl-p-menthane-3-carboxamide (WS-3), isopulegol, 3-(1-menthoxy)propane-1,2-diol, 3-(1-menthoxy)-2-methylpropane-1,2-diol, p-menthane-2,3-diol, p-menthane-3,8-diol, 6-isopropyl-9-methyl-1,4-dioxaspiro[4,5]decane-2-methanol, menthyl succinate and its alkaline earth metal salts, trimethylcyclohexanol, N-ethyl-2-isopropyl-5-methylcyclohexanecarboxamide, Japanese mint oil, peppermint oil, 3-(1-menthoxy)ethan-1-ol, 3-(1-menthoxy)propan-1-ol, 3-(1-menthoxy)butan-1-ol, 1-menthylacetic acid N-ethylamide, 1-menthyl-4-hydroxypentanoate, 1-menthyl-3-hydroxybutyrate, N,2,3-trimethyl-2-(1-methylethyl)-butanamide, n-ethyl-t-2-c-6 nonadienamide, N,N-dimethyl menthyl succinamide, substituted p-menthanes, substituted p-menthane-carboxamides, 2-isopropanyl-5-methylcyclohexanol; menthone glycerol ketals; 3-1-menthoxypropane-1,2-diol; and menthyl lactate; WS-30, WS-14, Eucalyptus extract (p-Menth-3,8-Diol), Menthol (its natural or synthetic derivatives), Menthol PG carbonate, Menthol EG carbonate, Menthol glyceryl ether, N-tertbutyl-p-menthane-3-carboxamide, P-menthane-3-carboxylic acid glycerol ester, Methyl-2-isopropyl-bicyclo (2.2.1), Heptane-2-

carboxamide; and Menthol methyl ether, and menthyl pyrrolidone carboxylate; and combinations thereof.

[0191] Nonlimiting examples of heating agents include vanillyl alcohol n-butylether, vanillyl alcohol n-propylether, vanillyl alcohol isopropylether, vanillyl alcohol isobutylether, vanillyl alcohol n-aminoether, vanillyl alcohol isoamylether, vanillyl alcohol n-hexylether, vanillyl alcohol methylether, vanillyl alcohol ethylether, gingerol, shogaol, paradol, zingerone, capsaicin, dihydrocapsaicin, nordihydrocapsaicin, homocapsaicin, homodihydrocapsaicin, ethanol, isopropyl alcohol, iso-amylalcohol, benzyl alcohol, glycerine, and combinations thereof. capsicum oleoresin, capsaicin, piperine, gingerol, shoagol, ginger oleoresin, cinnamon oleoresin, and cassia oleoresin, black pepper oleoresin, pepper oleoresin, vanillyl alcohol n-butyl ether, vanillyl alcohol n-propyl ether, vanillyl alcohol isopropyl ether, vanillyl alcohol isobutyl ether, vanillyl alcohol n-amino ether, vanillyl alcohol isoamyl ether, vanillyl alcohol n-hexyl ether, vanillyl alcohol methyl ether, vanillyl alcohol ethyl ether, gingerol, shogaol, paradol, zingerone, dihydrocapsaicin, nordihydrocapsaicin, homocapsaicin, homodihydrocapsaicin, ethanol, iso-propyl alcohol, iso-amylalcohol, benzyl alcohol, chloroform, eugenol, cinnamon oil, cinnamic aldehyde and phosphate derivatives of same.

[0192] Nonlimiting examples of suitable mouthfeel agents include, effervescing agents such as alkali metal carbonates, alkali metal bicarbonates, alkaline earth metal carbonates, and alkaline earth metal bicarbonates; citric acid; phosphoric acid; tartaric acid; malic acid; ascorbic acid; carbon dioxide; and combinations thereof.

[0193] Nonlimiting examples of tingling agents include Jambu extract, Vanillyl alkyl ethers, Vanillyl n-butyl ether, spilanthol, Echinacea extract, Northern Prickly Ash extract, capsaicin, capsicum oleoresin, red pepper oleoresin, black pepper oleoresin, piperine, ginger oleoresin, gingerol, shoagol, cinnamon oleoresin, cassia oleoresin, cinnamic aldehyde, eugenol, cyclic acetal of vanillin, menthol glycerin ether, unsaturated amides, and combinations thereof.

[0194] The sweetening agent may include sugar and sugarless sweeteners and components. Sugar sweeteners may include saccharide containing components including but not limited to glucose, sucrose, dextrose, maltose, dextrin, dried invert sugar, fructose, levulose, galactose, corn syrup solids, and the like, alone or in

combination. Sugarless sweeteners include components with sweetening characteristics but are devoid of the commonly known sugars. Sugarless sweeteners include such nonlimiting examples as sugar alcohols, glycerol, sorbitol, maltitol, maltitol syrup, mannitol, isomalt, erythritol, xylitol, hydrogenated starch hydrolysates, polyglycitol syrups, polyglycitol powders, lactitol, water-soluble sweetening agents such as dihydrochalcones, monellin, steviosides, glycyrrhizin, dihydroflavenol, water-soluble artificial sweeteners such as soluble saccharin salts, dipeptide based sweeteners, such as L-aspartic acid derived sweeteners, water-soluble sweeteners derived from naturally occurring water-soluble sweeteners, protein based sweeteners such as thaumaococcus danielli (Thaumatococcus danielli) (Thaumatococcus I and II) and talin; and the sweetener monatin (2-hydroxy-2-(indol-3-ylmethyl)-4-aminoglutaric acid) and its derivatives, sucralose, N-substituted APM derivatives such as neotame, salts of acesulfame, alitame, saccharin and its salts, cyclamic acid and its salts, and combinations thereof.

[0195] Nonlimiting examples of suitable souring agents include acetic acid, adipic acid, ascorbic acid, butyric acid, citric acid, formic acid, fumaric acid, glyconic acid, lactic acid, phosphoric acid, malic acid, oxalic acid, succinic acid, tartaric acid, and combinations thereof.

[0196] Nonlimiting examples of suitable bittering agents include quinine, naringin, quassia, phenyl thiocarbamide, 6-n-propylthiouracil, alum, salicin, caffeine, and combinations thereof.

[0197] The teeth whitening agent may include tooth whiteners, stain removers and anticalculus agents. Nonlimiting examples of suitable teeth whiteners include hydrolytic agents including proteolytic enzymes, abrasives such as hydrated silica, calcium carbonate, sodium bicarbonate and alumina, other active stain-removing components such as surface-active agents, such as anionic surfactants such as sodium stearate, sodium palmitate, sulfated butyl oleate, sodium oleate, salts of fumaric acid, glycerol, hydroxylated lecithin, sodium lauryl sulfate and chelators such as polyphosphates, which are typically employed in dentifrice compositions as tartar control ingredients. Also included are tetrasodium pyrophosphate and sodium tripolyphosphate, sodium tripolyphosphate, xylitol, hexametaphosphate, and an abrasive silica.



[0198] The breath freshening agent may include in addition to the flavors and cooling agents described hereinabove, a variety of compositions with odor controlling properties. These may include, without limitation, cyclodextrin and magnolia bark extract. The breath freshening agents may further be encapsulated. Nonlimiting examples of breath freshening agents include oils of spearmint, peppermint, wintergreen, sassafras, chlorophyll, citral, geraniol, cardamom, clove, sage, carvacrol, eucalyptus, cardamom, magnolia bark extract, marjoram, cinnamon, lemon, lime, grapefruit, and orange; aldehydes such as cinnamic aldehyde and salicylaldehyde; menthol; carvone; iso-garrigol; anethole; zinc citrate, zinc acetate, zinc fluoride, zinc ammonium sulfate, zinc bromide, zinc iodide, zinc chloride, zinc nitrate, zinc fluosilicate, zinc gluconate, zinc tartarate, zinc succinate, zinc formate, zinc chromate, zinc phenol sulfonate, zinc dithionate, zinc sulfate, silver nitrate, zinc salicylate, zinc glycerophosphate, copper nitrate, chlorophyll, copper chlorophyll, chlorophyllin, hydrogenated cottonseed oil, chlorine dioxide, beta cyclodextrin, zeolite, silica-based materials, carbon-based materials, enzymes such as laccase, and combinations thereof.

[0199] In an embodiment, an organoleptic component corresponds to a feature which is a property of the edible substrate. The edible substrate may contain one or more flavors. The organoleptic component may be the same flavor that is present in the edible substrate. For example, the edible substrate may include an orange flavor. The organoleptic component may also be an orange flavor. The organoleptic component may be a similar flavor or a flavor complimentary to the flavor in the edible substrate. Alternatively, the organoleptic component may be a flavor not present in the edible substrate.

[0200] In an embodiment, the edible substrate may be a chewing gum product. The chewing gum product may be coated or uncoated. The chewing gum product may further include a center-fill material. The organoleptic component may correspond to an ingredient in the coating, an ingredient in the chewing gum, and/or an ingredient in the center-fill material. For example, a chewing gum product with a center-fill material may include a strawberry flavor in the center-fill material. The organoleptic component may also include a strawberry flavor hereby linking the organoleptic component to the center-fill material. In this way, the organoleptic component

corresponds to a property of the edible substrate, namely the structure of the edible product (the center-fill portion).

[0201] In an embodiment, the feature is a characteristic of the edible ink-indicia and the organoleptic component corresponds this characteristic. Nonlimiting examples of characteristics of the ink-indicia include an aspect, an attribute, a component, and/or an element of the ink-indicia; one or more colors of the ink-indicia; a meaning conveyed by the ink-indicia (particularly when the ink-indicia is a word or text) when the ink-indicia is viewed by a person; a perception generated by the ink-indicia when viewed by a person; a concept conveyed or communicated by the ink-indicia when viewed by a person; and combinations thereof.

[0202] The printing device 32 may be used to form an edible product 50 as shown in Figure 2. It is understood that the edible product 50 may correspond to the individual confectionery piece 24 of Figure 1. Edible product 50 may include an edible substrate 52 and an edible ink-indicia 54 formed from ink composition 53 printed from printing device 32 and onto the substrate 52. Ink-indicia 54 may include a feature 56. Printing device 32 may also dispense an organoleptic component 58 corresponding to the feature 56 of the ink-indicia 54.

[0203] The edible substrate 52 may be any edible comestible, material, or substrate as previously discussed herein. Edible substrate 52 may have planar surfaces, non-planar surfaces, or a combination of planar and non-planar surfaces. Edible substrate 52 may have a flat, a curved, a wavy, a convex (i.e., pellet, tablet, or bean-shaped), or a concave surface contour. The edible substrate may be coated or uncoated. In an embodiment, edible substrate 52 may be a confectionery material, such as a substantially flat stick of chewing gum as shown in Figure 2.

[0204] The ink-indicia 54 may be any edible ink or edible ink composition as discussed herein. In an embodiment, the edible ink-indicia may be an inkjet-indicia. The edible ink-indicia 54 may include a feature 56. The feature may be a portion of the ink-indicia or all of the ink-indicia. For example, Figure 2 shows ink-indicia 54 disposed on the surface of edible substrate 52, ink-indicia 54 being an object, such as an apple 55. The feature 56 is the shape of the ink-indicia 54, namely, the shape of the apple 55. The ink-indicia 54 may include additional features such as the color/colors of the object (i.e., the apple 55 may be a single color or multiple colors), and/or the

shading of the ink-indicia (i.e., the apple 55 may be a full object as opposed to an outline of an apple). In an embodiment, printing device 32 may eject the ink composition to discrete areas of edible substrate 32 as desired. For example, apple 55 may be a first color and the remaining areas of edible substrate 52 may be a second color (or no color).

[0205] The edible product 50 also includes an organoleptic component 58. The organoleptic component 58 may be one or more than one of any organoleptic component as previously discussed herein. Organoleptic component 58 corresponds to feature 56. In other words, the organoleptic component may be any sensory component that may be associated with, or coordinated with feature 56. In particular, organoleptic component 58 may be any sensory-perceived component that typically accompanies, is associated with, complements, emphasizes, accentuates, highlights, matches, relates to, is in accord with, links with, or is connected to feature 56. In an embodiment, printing device 32 prints or otherwise jets organoleptic component 58 onto edible substrate 52. In a further embodiment, organoleptic component 58 may be disposed directly on ink-indicia 54 and/or feature 56. In yet a further embodiment, the organoleptic component 58 may be a component or an element of the edible ink 53 dispensed from printing device 32 and used to form ink-indicia 54. In yet another embodiment, printing device 32 may dispense organoleptic component 58 to discrete portions of edible substrate 52 (i.e., onto apple 55) or onto the entire surface of edible substrate 52.

[0206] In an embodiment, organoleptic component 58 may be a flavoring agent such as an apple flavor, for example. Organoleptic component 58 may also include a souring agent, included with or distinct from the flavoring agent, that when placed in contact with a person's mouth delivers a sour taste or sour apple taste to the consumer. Edible product 50 advantageously provides a visually appealing product and a multi-sensory consumption experience, enjoyable to the consumer. Thus, the organoleptic component 58 (as either an apple flavor and/or a souring agent) corresponds to the feature 56 (the shape of an apple) of the ink-indicia 54, which as an object.

[0207] Figure 3 shows printing device 32 being used to form edible product 60. The edible product 60 may correspond to the individual confectionery piece 24 of Figure 1. Edible product 60 includes edible substrate 62 such as a chewy or soft candy

with ink composition 63 dispensed from printing device 32 forming edible ink-indicia 64, the ink-indicia 64 being an object. The ink-indicia 64 has feature 66, namely the shape of a lemon. In this embodiment, edible substrate 62 may include a flavoring agent such as a lemon flavor, for example. Organoleptic component 68 may include a souring agent, such as citric acid dispensed from printing device 32 in either liquid or particulate form. Organoleptic component 68 may deliver a sour taste in conjunction with the lemon flavor when edible product 60 is placed in the mouth of a consumer. In a further embodiment, organoleptic component 68 may have a particulate or granular texture or rough mouthfeel when disposed upon the surface of edible substrate 62. This may occur as the organoleptic component may be dispensed as a solid particulate or dispensed as a liquid that may dry with a granular texture. As organoleptic component 68 is disposed on the surface of edible substrate 62, organoleptic component 68 may deliver an instant and up-front sour sensation accentuated with a grainy mouthfeel of the souring agent to a person when consuming edible product 60. This may occur when the portion of edible substrate 62 having ink-indicia 64 comes into contact with the consumer's tongue. Thus, the consumer may associate the grainy mouthfeel of the particulate souring agent with the intense and instantaneous sour taste of the organoleptic component. In this way, the organoleptic component (the souring agent) corresponds to a feature of the ink-indicia (the perception that the lemon-shaped ink-indicia will have a sour taste). Ink-indicia 64, feature 66, and organoleptic component 68 may thereby heighten consumer interest in product 60 by delivering an edible product with a visually attractive ink-indicia in conjunction with a corresponding sensory experience adding to the excitement of consuming the edible product.

[0208] In an embodiment, printing device 32 may be used to form edible product 70 as shown in Figure 4. The edible product 70 may correspond to the individual confectionery piece 24 of Figure 1. Printing device 32 dispenses, sprays, or jets ink component 73 onto edible substrate 72 to form ink-indicia 74. In this embodiment, the ink-indicia is an advertising indicia with multiple features 76a, 76b. Advertising indicia 74 includes a text feature 76a as indicated by the term DOUBLEMINT. Advertising indicia 74 also includes feature 76b, a fanciful shape or logo, namely the two-headed arrow. Also dispensed from printing device 32 is

organoleptic component 78 that may correspond to or be associated with one of or both features 76a or 76b. Organoleptic component 78 may be disposed on ink-indicia 74, feature 76a or feature 76b. Alternatively, organoleptic component 78 may be disposed on other portions of edible substrate 72.

[0209] In an embodiment, edible substrate 72 may be a stick of chewing gum. The chewing gum may include flavorants and sweeteners as are commonly known in the art. In an embodiment, organoleptic component 78 may be one or more cooling agents as previously disclosed and may be a component of ink 73 or may be a distinct, stand-alone component dispersed separately from the ink component from printing device 32. Nonlimiting examples of suitable cooling agents include menthol, p-mentha-3,8-diol, 1-isopulegol, menthone ketals, menthyl lactate, monomenthol succinate, menthyl pyrrolidone carboxylate, 3-1-menthoxypropane-1,2-diol (Takasago Cooling Agent, TCA), N-ethyl-p-menthane-3-carboxamide (WS-3), 2-isopropyl-N, 2,3-trimethylbutyramide (WS-23), other cyclic and acyclic carboxamides and 3,3,5-trimethylcyclohexanol, other like cooling agents, or mixtures thereof. In an embodiment, the organoleptic component 78, may be disposed on feature 76a, such as on the term "DOUBLEMINT," or alternatively, organoleptic component 78 may be disposed on the term "MINT." In another embodiment, organoleptic component 78 may be disposed on one or both of the arrow head portions of feature 76b. Thus, organoleptic component 78, the cooling agent, corresponds to and accentuates the feature of the ink-indicia text "DOUBLEMINT,"—the feature being the perception that the term "DOUBLEMINT" will provide a cool taste sensation (particularly with the provision of an instantaneous wave or burst of cooling agent when edible product 70 is placed in a consumer's mouth).

[0210] In yet a further embodiment, edible product 70 may include two organoleptic components—a cooling agent and one or more mint flavoring agents, for example—present anywhere on edible substrate 72 as previously discussed. Two or "double" organoleptic components jetted onto the surface of edible substrate 72 highlight, augment, and correspond to features 76a and 76b of ink-indicia 74 and to a meaning of the word "DOUBLEMINT" (i.e., two mint flavors and/or two cool sensations). This advantageously increases the consumer's enjoyment when consuming edible product 70. Thus, organoleptic component 78 corresponds to

feature 76a, 76b by accentuating, amplifying and highlighting a characteristic or property of the feature (i.e., a meaning of the word “mint” as “cool”) and by playing on and corresponding to a meaning of the term depicted by ink-indicia 74 (i.e., provision of two minty/cool organoleptic components corresponding to a meaning of the term “DOUBLEMINT” as two mint flavors or two cool taste sensations).

[0211] In an embodiment, printing device 32 may include a dosing controller 71 as shown in Figure 4. Dosing controller 71 may be in operative communication with printing device 32 to deliver a precise amount of organoleptic component to edible substrate 72. Dosing controller 71 may be a component of printing device 32 or a stand-alone unit. The skilled artisan will appreciate that with the provision of the organoleptic component concentration and provision of the jetted droplet volume dispersed from printing device 34, dosing controller 71 may be configured to deliver a precise amount of organoleptic component to the substrate. Thus, dosing controller 71 may be any data processor, flow regulator, flow rate sensor, timing device, or any combination thereof that may be configured with printing device 32 capable of controlling the number of jetted droplets of organoleptic component delivered to edible substrate 72. The organoleptic component may be a component of ink composition 73. Alternatively, the organoleptic component may be dispersed or dissolved in a carrier that does not include the ink composition. This carrier may be contained in a separate or dedicated reservoir and may be ejected either simultaneously with ink composition 73 or independently from ink composition 73.

[0212] In a further embodiment, dosing controller 71 may be used to dispense a precise amount of organoleptic component 78 onto edible substrate 72. As used herein “precision dose” or “precision dosing” is a quantity of a component (or the delivery of a quantity) that is within 0.01% of a predetermined quantity of the component. For example, when it is predetermined to add 1.0 g of a flavoring agent to the edible substrate, a precision dose would be from about 0.9999 g to about 1.0001 g of the flavoring agent. The edible product 70 may include a precision dose of ink composition 73, together or separate from organoleptic component 78, or a combination thereof.

[0213] In an embodiment, dosing controller 71 may be used to deliver a quantity of organoleptic component to within about 0.01% of a predetermined value.

In a further embodiment, dosing controller 71 may be used to deliver an amount of organoleptic component not to exceed a predetermined value. This may be advantageous for the addition of organoleptic components with high efficacy or regulated organoleptic components which excess amounts are not permitted.

[0214] In a further embodiment, dosing controller 71 may include a weight detector 75. Weight detector 75, such as a scale for example, may be in operative communication with dosing controller 71 to detect the weight of edible substrate 72. Dosing controller 71 may dispense a quantity of organoleptic component droplets until a predetermined or threshold weight value is detected by weight detector 75. Upon detection of this predetermined weight value, dosing controller 71 may send a signal to printing device 32 to cease ejection of the organoleptic component.

[0215] In a further embodiment, weight detector 75 may be used to provide an initial weight of edible substrate 72. With a weight value of the edible substrate, dosing controller 71 may determine how many droplets need be dispensed in order to provide the edible substrate with a predetermined weight percentage of organoleptic component. In an embodiment, weight detector 75 may be used to weigh each edible substrate 72 before the addition of the organoleptic component. Based on the weight of edible substrate 72, dosing controller 71 may selectively dispense a precise number of droplets to provide each individual edible product 70 with 2.0% by weight of an organoleptic component, such as a cooling agent, for example. In an embodiment, dosing controller 71 may be used to deliver a quantity of organoleptic component within 0.01% of a predetermined value. Consequently, dosing controller 71 and weight detector 75 may be used to tailor the amount of dispensed ink composition or organoleptic component based on the individual weight of each edible substrate. Thus, a plurality of edible products may be formed, with each edible product having the same or nearly the same weight percentage of organoleptic component in each piece.

[0216] Utilization of dosing controller 71 is advantageous for the delivery of organoleptic components with high efficacy such as high intensity sweetening agents, flavoring agents, cooling agents, or active agents for example. Dosing controller 71 may also be used to precisely dose an active agent onto the surface of edible substrate 72. The active agent may be a medicament, a pharmaceutical, a drug, a medication, or any compound designed to be taken by a human as a medication to combat an illness

or disease or to promote general health. The active agent may be a component of either the ink composition or the organoleptic composition. Consequently, the active agent may be a component of the ink-indicia and/or be disposed on or contact a feature of the ink-indicia. Alternatively, the printing device may dispense or eject the active agent as a discrete ingredient onto the edible substrate. Nonlimiting examples of suitable medicaments may include any drug, vitamin, stimulant or other chemical or compound which is used for health related purposes. In an embodiment, the active agent may be a beneficial bacteria such as a probiotic including such nonlimiting examples as lactobacillus, Escherichia, enterococcus, streptococcus, bifidobacterium, and sacharomyccs. In a further embodiment, the active agent may be a plaque reducing agent.

[0217] In an embodiment, printing device 32, dosing controller 71, and/or weight detector 75 may be used to precisely dispense a microdose of an organoleptic component and/or an active agent onto edible substrate 72. As used herein, "microdose" is an ingredient, component, or agent having a mass from about 0.01 mg to about 1g, or any value therebetween. A nonlimiting example of a microdose is a component having a mass from about 0.1 mg to about 100 mg (with or without a carrier). In an embodiment, printing device 32, dosing controller 71, and/or weight detector 75 may dispense any desired amount of an organoleptic component (such as a cooling agent, for example), in the range of 0.5 mg-3.0 mg. In a further embodiment, a 22 mg microdose of a plaque reducing agent may be dispensed onto edible substrate 72.

[0218] In an embodiment, printing device 32 may be used to form edible product 80 as shown in Figure 5. Printing device 32 dispenses, ejects or jets ink component 83 onto edible substrate 82 to form ink-indicia 84. Edible substrate may be a soft candy or chewing gum. In this embodiment, the ink-indicia 84 may be a slogan. In an embodiment, ink-indicia 84 may include multiple features as each letter and/or word may be considered an individual feature as the size, font, layout and design of each letter/word may be varied as desired. Each letter or word may be printed with single or multiple colors that may be the same or different than the color(s) used to print the other letters or words. For example, the terms "Gotta Have" may be a first



color or a first multiple color set and the term “Sweet?” may be a second color or a second multiple color set.

[0219] In an embodiment, the edible product 80 includes a feature 86. The feature 86 is a perception, a meaning, and/or an expectation conveyed by the slogan 84 when a person views or reads “Gotta Have Sweet?” In other words, the feature 86 is the expectation conveyed to a person by way of the slogan 84 that the edible product 80 has or will have a sweet taste when consumed. An organoleptic component 88 may be jetted or dispensed from the printing device 32 onto any portion or discrete portions of edible product 80.

[0220] The organoleptic component 88 may be a sweetening agent. The sweetening agent may contain sugar, may be sugar-free, and/or may be a high-intensity sweetener. The sweetening agent may be any sweetening agent as previously discussed herein. Further nonlimiting examples of suitable sugar sweetening agents include saccharide-containing components such as sucrose, dextrose, maltose, dextrin, dried invert sugar, fructose, levulose, galactose, corn syrup, corn syrup solids, and the like, alone or in combination, as are commonly known in the art. Further nonlimiting examples of sugar-free sweeteners may include sucralose, aspartame, salts of acesulfame, alitame, saccharin and its salts, neotame, cyclamic acid and its salts, glycyrrhizin, dihydrochalcones, thaumatin, monellin, and the like, alone or in combination.

[0221] In an embodiment, the organoleptic component 88 (the sweetening agent) may be disposed on or contact the term “Sweet” or “Sweet?” on the surface of edible substrate 82. Organoleptic component 88 may advantageously provide an initial or up-front burst of sweetness when edible product 80 is placed in a consumer’s mouth thereby bringing more enjoyment and excitement to the consumption of edible product 80. Organoleptic component 88 (the sweetening agent) thereby connects, links, correlates, and/or associates the feature 86 (the expectation conveyed by slogan 84 of a sweet taste) conveyed by the edible ink-indicia, namely slogan 84 (“Gotta Have Sweet?”), when the edible product 80 is viewed by a person. In this way, the organoleptic component 88 (the sweetening agent) corresponds to the feature 86 (the expectation of a sweet taste) of the edible ink-indicia, slogan 84 (“Gotta Have Sweet?”).

[0222] In an embodiment, printing device 32 may be placed in operative communication with a controller 100 to form edible product 90 having a high resolution image as shown in Figure 6. Controller 100 may be any electronic data processing device and/or electronic data storage media such as a workstation, a personal computer, a laptop computer, a personal data assistant, or any other processing device alone or in conjunction with an electronic memory device, such as an electronic image storage device such as a computer, for example. Controller 100 may contain suitable hardware, software and/or logic to convert a stored electronic image into a series of commands in order to direct printing device 32 to selectively dispense or jet ink composition(s) onto the surface of edible product 90 to replicate or duplicate the electronic image on the surface of the edible substrate.

[0223] In an embodiment, a high resolution image stored in controller 100 operatively connected to printing device 32 may be used to apply a high resolution image onto edible substrate 90 as shown in Figure 6. Controller 100 directs printing device 32 to selectively jet ink component 93 onto edible substrate 92 to form an ink-indicia 94 that may be a high resolution image. In an embodiment, edible substrate 92 may be a stick of chewing gum. Ink component 93 may be one or more inks. The high resolution image may or may not be multicolored. Ink-indicia may 94 may include feature 96 that may be portions of or the entirety of high resolution image such as a landscape scene or a mountain range. For example, ink-indicia 94 may include feature 96a, a portion of the high resolution image, namely, the mountain top, or a snow-capped mountain top. Ink-indicia 94 may further include feature 96b, the mountain slope or mountain base that may be a different color or colors than mountain top feature 96a.

[0224] Printing device 32 may dispense one or more organoleptic components 98 to correspond with each feature. For example, the printing device may be used to dispense organoleptic component 98a that is associated with mountain top feature 96a. In an embodiment, organoleptic component 98a may be a cooling agent or a teeth whitening agent corresponding to the feature 96a of a snow-covered, cold, mountain-top. In a further embodiment, mountaintop feature 96a may be white in color or otherwise depict a snow-capped mountain top. In a further embodiment, the organoleptic component 98a may be a tingling agent corresponding to the perception

that the feature 96a is the peak or tip of the mountaintop and is thereby pointed, sharp, and/or tingly.

[0225] Organoleptic component 98a may be dispensed anywhere on edible substrate 92. In yet a further embodiment, organoleptic component 98a may be selectively dispensed or jetted directly onto mountain top feature 98a. In this way, organoleptic component 98a advantageously highlights the mountain top feature 96a of ink-indicia 94. For example, organoleptic component 98a as a cooling agent highlights the visual perception that the mountain-top is snow-capped and cold. Organoleptic component 98a as a tingling agent emphasizes and corresponds to the melting of snow on a mountain top.

[0226] In an embodiment, organoleptic component 98b may be selectively dispensed on feature 96b. Organoleptic component 98b may be a substance that may correspond to or may be further associated with mountains, the outdoors, or a rustic, organic, or nature-esque lifestyle. For example, organoleptic component 98b may be a breath freshening agent or a teeth whitening agent, or a combination thereof. Organoleptic component 98b thereby further emphasizes conceptions communicated to a consumer when viewing the edible ink-indicia, mountain range 94, namely, a clean, good-smelling, good-feeling, outdoors aura and active, lively lifestyle. Thus, the organoleptic components 98a and 98b correspond to, accentuate, and highlight the features 96, 96a, and 96b of the edible ink-indicia (image 94 of a mountain range) to convey to a person viewing the edible product 90 feelings of well-being, increased energy, increased motivation, increased self-assurance when edible product 90 is consumed by a person.

[0227] In an embodiment, the edible substrate 92 may include a property which is a feature of the edible product 90. The property may be a surface texture such as a surface embossment as shown in Figure 6A. The surface embossment, may be any indentation, protrusion, etching, or similar structure on the surface of edible substrate 92. In an embodiment, the surface embossment may be protrusions 96c. Protrusions 96c may be formed during the chewing gum production process. For example, protrusions 96c may be imprinted upon the surface of edible substrate 92 during the sizing or sheeting process as is commonly known in the art. Protrusions 96c may be the sole feature of the edible product 90. Alternatively, the protrusions

96c may be linked, correspond to, connected to, related to, or emphasize the edible ink-indicia, image 94 of the mountain range. Thus, features of the edible substrate 92 may be present in conjunction with (and correspond to) other features, such as features 96a and/or 96b of the edible ink-indicia as shown in Figure 6.

[0228] In an embodiment, feature 96c may be protrusions in registration with or otherwise associated with the edible ink-indicia, image 94. Protrusions 96c may be the material of edible substrate 92. Alternatively, protrusions 96c may be an additional edible material. In other words, the edible ink-indicia, image 94, may be printed upon the feature, protrusions 96c, to provide an edible product with a high resolution image of a landscape with three-dimensional features. The organoleptic components 98a, 98b may correspond to the features 96a, 96b and/or 96c. Organoleptic component 98a (a cooling agent) may be dispensed on the tops of protrusions 96c to accentuate a cold, snow-covered mountaintop. The slope and tops of the protrusions 96c may correspond to the mountain slopes of feature 96b and mountain tops of feature 96a of the mountain image 94 of edible ink-indicia. Organoleptic components 98a and 98b may be added to the image 94 having features 96a, 96b as previously discussed. The protrusions 96c further accentuate mountain top feature 96a and mountain slope feature 96b. Organoleptic component 98a corresponds to the structural feature provided by protrusions 96c. Organoleptic component 98b further corresponds to the structural feature of the protrusions 98c. The feature of the edible substrate 92, namely protrusions 96c, may thereby provide a three-dimensional property to edible product 90. Edible product 90 advantageously provides the appearance of one or more mountains rising from the surface of edible substrate 92 with corresponding organoleptic components and ink-indicia. Protrusions 96c heightens consumer interest for edible product 90 and provides an additional mouthfeel sensory experience when edible product 90 is consumed.

[0229] In an embodiment, controller 100 and printing device 32 may be used to apply a high resolution image onto edible substrate 110 as shown in Figure 7. Printing device may eject or dispense one or more ink compositions 113 onto edible substrate 112 to print a high resolution ink-indicia 114, that may be an advertising indicia. In an embodiment, ink-indicia 114 may cover the entire area of the exposed surface of edible substrate 112. Advertising indicia 114 may be printed in both sides of edible

substrate 110, fully covering the edible substrate. Advertising indicia 114 may have a high resolution, such as photographic image resolution, for example. In an embodiment, advertising indicia 114 may have a resolution of about 100 dpi or about 360 dpi or greater.

[0230] Advertising indicia 114 may have one or more features. For example, advertising indicia 114 in Figure 7 includes feature 116a, the term “JUICY FRUIT,” text in a decorative font, and a symbol, a double-headed fanciful arrow 116b. Edible product 110 may or may not include a surface-applied organoleptic component. In an embodiment, an organoleptic component 118 corresponding one or both features 116a, 116b may be dispensed from printing device 32 onto the surface of edible substrate 112. For example, organoleptic component 118 may be a fruit flavoring agent to emphasize the term “JUICY FRUIT” or “FRUIT.” Organoleptic component 118 may be dispersed anywhere on edible substrate 112, or selectively dispersed on feature 116a, for example.

[0231] In an embodiment, edible product 110 may be placed in a transparent, translucent, or otherwise see-through wrapper 120 as shown in Figure 8. In a further embodiment, edible product 110 may be a stick of chewing gum. Wrapper 120 permits ink-indicia 114 to be viewed or otherwise seen through wrapper 120. In an embodiment, the resolution of ink-indicia 114 is high enough to replicate or mimic the advertising indicia disposed on conventional opaque packaging substrates such as paper, plastic, foil, or packaging. Wrapper 120 may be made of any suitable transparent wrapping material such as a polymeric material, for example. Edible product 110 and wrapper 120 may replace conventional wrapping systems that conceal the product from view until the wrapper is opened.

[0232] In a further embodiment, edible product 110 may be packaged in transparent package 122 with other products 110 as shown in Figure 9. Package 122 may also be made of a transparent material permitting high resolution ink-indicia 114 to be seen through package 122. Each individual edible product 110 disposed in package 122 may or may not be individually wrapped in wrapper 120. Package 122 may include a tab 124 permitting access to the contents of the package. Edible product 110 with wrapper 120 and/or package 122 may advantageously eliminate the need for costly printed wrapping and packaging because of the visibility of advertising indicia

114 therethrough. Wrapper 120 and/or package 122 may thereby replace conventional opaque wrappers. Edible product 110 with wrapper 120 and/or package 122 may also increase consumer attention to edible product 110 because of the presence of the high resolution advertising indicia 114 directly on edible substrate 112 in conjunction with the absence of conventional packaging and wrapping. Thus, edible product 110 with high resolution advertising indicia 114 with or without wrapper 120 or packaging 122, may be utilized to pique consumer interest in the edible product and consequently increase sales of edible product 110.

[0233] In an embodiment, another wrapped edible product is provided. The wrapped edible product includes an edible substrate having an edible ink-indicia disposed on a surface thereof and a wrapper surrounding the edible substrate. The wrapper includes a wrapper indicia on an exposed surface of the wrapper. The wrapper indicia matches the edible ink-indicia.

[0234] As used herein, “matching” or “matches” is the close resemblance in size, shape, and color between two objects. A wrapper indicia which matches an edible-ink indicia closely resembles the edible ink-indicia with respect to the size, the shape, and/or the color(s) of the edible ink-indicia. Thus, the wrapper indicia matching the edible ink-indicia appears very similar to, and may be identical to, the edible ink-indicia.

[0235] In an embodiment, the edible product 110 includes the advertising indicia 114 Juicy Fruit as shown in Figure 7. A wrapper may surround the edible product 110. The wrapper may be opaque, transparent, or translucent as desired. The wrapper may include a wrapper indicia that matches the advertising indicia 114. The matching wrapper indicia includes the term “Juicy Fruit,” has the same features as the advertising indicia 114, is substantially the same size as the advertising indicia 114, and includes the same colors as the advertising indicia 114.

[0236] In an embodiment, edible product 530 includes an edible substrate 532 with an edible ink-indicia 538 “WUBMV” and accompanying colored portions 531a-e as shown in Figure 19. A wrapper may surround the edible product 530, the wrapper having a wrapper indicia matching the edible ink-indicia 538 and 531a-e. In other words, the matching wrapper indicia has the term “WUBMV” in substantially the same size as edible ink-indicia 538. The wrapper indicia also has portions that

resemble portions 531a-e in size, shape and color. Thus, when the wrapper is removed from the edible product 530, the edible product 530 has the appearance of still being wrapped.

[0237] In an embodiment, printing device 32 (either alone or in conjunction with controller 100) may be used to prepare an edible product 130 as shown in Figure 10. The edible product may be coated or uncoated. In an embodiment, the edible product 130 includes coated edible substrate 132. The coating of edible substrate 132 may be a hard coating or a soft coating, the coating containing sugar or being sugar-free. The coating may be formed by way of pan coating. Pan coating entails applying successive layers of syrup to a center material, such as a confectionery or chewing gum material, and rotating and drying the material in a rotating pan. The coating may also be a wax or other hydrophobic material or protective material alone or in combination with the pan coating as is commonly known in the art. In an embodiment, coated edible substrate 132 may be a coated chewing gum pellet.

[0238] The printing device 32 may eject an ink component 133 onto the surface of coated edible substrate 132 to form ink-indicia 134. Ink component 133 may include ingredients such as adhesion enhancers, wax and/or other components to promote adhesion to the surface of coated edible substrate 132. In an embodiment, printing device 32 selectively jets ink component 133 onto discrete areas of coated edible substrate 132 to form ink-indicia 134 having a feature 136 of a random pattern and/or one or more colors. An organoleptic component 138, which may or may not be an ingredient of ink component 133, may be dispensed by printing device 32 onto the surface of coated edible substrate 132. The organoleptic component 138 may also include ingredients such as adhesion enhancers, wax, and/or other components to promote and ensure adhesion of the organoleptic component to the surface of coated edible substrate 132. In an embodiment, organoleptic component 138 may be disposed on or otherwise contact ink-indicia 134. Organoleptic component may correspond to, or otherwise accentuate, enhance or highlight the feature 136 of the ink-indicia 134. For example, the feature 136 may be a random pattern of a cool color such as blue and organoleptic component 138 may be a cooling agent. The cooling aspect of the organoleptic component 138 thereby corresponds to the color feature of the ink-indicia. Alternatively, the feature 136 of the ink-indicia 134 may be a hot

color, such as red, and organoleptic component 138 may be a heating agent or a hot, or spicy flavoring agent such as cinnamon which links and corresponds to the hot color.

[0239] In an embodiment, the coated edible substrate 132 may have a first side and a second side, the first and second sides opposing each other. The printer 32 may print respective first and second edible ink-indicia on both the first and second sides of the edible substrate 132. In an embodiment, the controller 100 may contain suitable logic to register or otherwise connect the first edible ink-indicia on the first side with the second edible ink-indicia on the second side. The first edible ink-indicia contacts the second edible ink-indicia at the edges of the edible substrate. In other words, the edible substrate may contain an edible ink-indicia which extends from the first side to the second side or vice versa. This provides the edible product 130 with a seamless, uninterrupted edible ink-indicia 134 on the first and second sides of the edible substrate.

[0240] For example, the edible ink-indicia 134 with the feature 136 (the random pattern) may extend from the first surface to the edges of the edible substrate 132 and continue, uninterrupted, around onto the second side of the coated edible substrate 132. At the edges of the coated edible substrate 132, the edges of the random pattern on the first side contact and continue the random pattern on the second side. Thus, the edible ink-indicia 134 on the first side of the edible substrate is in registration with the edible ink-indicia on the second side of the edible substrate. The controller 100 may direct the printing device 32 to print the ink component 133 in order to ensure contact between the edible ink-indicia 134 on the first and second sides at the edible substrate edges so as to form a seamless ink-indicia 134 around the exterior of the coated edible substrate 132.

[0241] In an embodiment, printing device 32 may be used to prepare an edible product 140 in packaging 141 that includes a plurality of coated edible substrates 142a, 142b, and 142c each having respective ink-indicia 144a, 144b, 144c, respective features 146a, 146b, 146c (colors and/or random patterns) and respective organoleptic components 148a, 148b, 148c disposed on the coating surface as shown in Figure 11. For example, coated edible substrate 142a may include a blue ink-indicia 144a with random pattern feature 146a and organoleptic component 148a corresponding to the blue color, such as a blueberry flavoring agent. Coated edible substrate 142b may



include an orange ink-indicia 144b with random pattern feature 146b and an organoleptic component 148b corresponding to an orange color such as an orange flavor. Coated edible substrate 142c may include a green color ink-indicia 144c with random pattern feature 146c and an organoleptic component 148c corresponding to green such as a lime flavoring agent. One of ordinary skill in the art will appreciate the number of combinations between ink-indicia, features and organoleptic components for the individual edible pieces is limited only by one's imagination.

[0242] Packaging 141 may be made of a transparent or translucent material permitting the individual coated edible substrates within packaging 141 to be viewed or otherwise to be visible from the packaging exterior. A further feature of edible product 140 is the provision of multiple individual pieces, with each piece having an ink-indicia with one or more different features. For example, ink-indicia 144a may have feature 146a (a first color, and/or a first random pattern) and a first organoleptic component 148a corresponding to the feature 146a (blue color and blueberry flavoring agent); ink-indicia 144b may have a feature 146b (a second color and/or a second random pattern) and a second organoleptic component corresponding to the feature 146b (a white color corresponding to a cooling agent); and ink-indicia 144c may have a feature 146c (a third color and/or a third random pattern) and a third organoleptic component 148c corresponding to the feature 146c (a red color corresponding to a heating agent). The random patterns, colors, flavors and combinations in which the individual coated edible substrates may be consumed advantageously heightens consumer interest in edible product 140 and increases sales thereof.

[0243] In an embodiment, printing device 32 may be used to form edible product 150 as shown in Figure 12. Edible product 150 may include coated edible substrate 152 upon which printing device 32 may selectively dispense first ink component 153a and second ink component 153b to form multicolor ink-indicia 154. Ink-indicia 154 may include a feature 156 that is a multicolored random pattern. Controller 100 may be used to cooperatively and selectively jet ink components 153a and 153b so as to cover substantially the entire surface of the coating. In an embodiment, feature 156 may be a random pattern of first ink composition 153a and a random pattern of second ink composition 153b, the ink compositions cooperatively ejected or in registration with each other so as not to contact the same portion of the

coating surface. Alternatively, controller 100 and printing device 32 may jet ink compositions 153a, 153b in an overlapping manner at discrete portions the coated surface to create select regions of a third color on the surface of coated edible substrate 152.

[0244] A first organoleptic component 158a may be selectively dispensed by printing device 32 onto regions where first ink composition 153a is present. A second organoleptic component 158b may be selectively dispensed upon second ink composition 153b regions in a similar manner. In an embodiment, first organoleptic component 158a may be an ingredient of ink composition 153a and second organoleptic component 158b may be an ingredient of second ink composition 153b. Accordingly, each organoleptic component may be simultaneously dispensed along with its respective ink component.

[0245] In an embodiment, each organoleptic component corresponds to or otherwise accentuates the ink composition or feature with which it is associated. For example, first ink composition 133a may be a yellow color and first organoleptic component 138a may be a flavoring agent corresponding to yellow, such as a lemon flavoring agent, for example. Second ink composition 133b may be a clean color, such as white color and second organoleptic component 138b may have a clean or cleaning property such as a breath freshening agent or a teeth whitening agent to accentuate the clean color. Edible product 150 provides a multiple colored coated edible product having a distinct surface characteristic and appearance. The multiple colored ink-indicia with random pattern feature and a plurality of organoleptic components all disposed on the coated surface advantageously provides an attractive comestible product to consumers.

[0246] In an embodiment, an apparatus 200 for preparing an edible substrate with a three-dimensional object is provided as shown in Figure 13. Apparatus 200 includes a dispensing device 202 and a base 204. Base 204 supports a substrate 206 below dispensing device 202. Substrate 206 may be any edible substrate as previously discussed herein. Dispensing device 202 dispenses an edible material 208 onto substrate 206 in a layer by layer or an incremental manner to form or build a three-dimensional object on the surface of substrate 206.

[0247] Edible material 208 may be any edible material or substance as previously discussed herein. It is understood that edible material 208 is flowable or otherwise placed in a fluid or flowable state when dispensed from dispensing device 202. In an embodiment, a hopper 210 may be placed in fluid communication with dispensing device 202 by way of conduit 214. Hopper 210 with receptacles 212 may be used to contain edible materials that are solid or non-flowable at ambient conditions. Heating elements 216 may be used to heat materials held within hopper 210 to maintain these materials in a flowable state. Conduit 214 may be a multiple channel conduit to deliver a plurality of flowable edible materials to dispensing device 202. A flow regulator such as a pump 218 for example, may be operatively connected with hopper 210 and/or conduit 214 to deliver flowable edible material to dispensing device 202.

[0248] Dispensing device 202 may be supported by support system 220 to move dispensing device 202 in a horizontal (crosswise) manner as indicated by arrows G and H respectively. Support system 220 may also move dispensing device in a vertical (up and down) manner. Support system 220 enables dispensing device 202 to be movable with respect to base 204 and substrate 206. Alternatively, dispensing device 202 may be stationary and base 204 may be movable to move substrate 206 with respect to dispensing device 202.

[0249] In an embodiment, dispensing device 202 may be a non-contact printing device such as any ink jet printing device as described herein. In a further embodiment, dispensing device 202 may be substantially similar to ink jet printing device 32. Dispensing device 202 may be adapted to jet or eject edible ink compositions as well as other edible materials. Reservoirs 222 may contain edible ink or may be adapted to contain any other flowable edible material as discussed herein. Dispensing device 202 may be further adapted to receive and subsequently jet or eject flowable edible material transported through conduit 214. In an embodiment, dispensing device 202 may eject a single fluid containing a plurality of edible materials. Alternatively, dispensing device 202 may include nozzles dedicated to dispense different flowable edible materials. For example, dispensing device 202 may include first nozzles dedicated to the ejection of ink compositions and second nozzles dedicated to the ejection of other fluid edible materials. Dispensing device 202 may

dispense one or more different types of edible materials either simultaneously or sequentially.

[0250] In an embodiment, a controller 224 may be in operative communication with dispensing device 202. Controller 224 may be any data processing device, such as a computer, that may generate three-dimensional coordinate data of an object, convert this data into commands, and deliver these commands to support system 220 and dispensing device 202 in order to form the three-dimensional object. Responsive to commands generated by controller 224, support system 220 may move dispensing device 202 to pass over substrate 206 and sequentially dispense layers of flowable edible material 208 to build or form a three-dimensional (3-D) object 226 on substrate 206. The three-dimensional object may be any shape, size, design, or symbol as desired. Object 226 may include any feature and corresponding organoleptic component or color(s) as previously discussed herein. The presence of 3-D object 226 on edible substrate 206 advantageously piques consumer interest in the edible product and promotes or otherwise contributes to the increase of sales of the edible product.

[0251] Figure 13A shows an initial phase of the 3-D object formation. In the initial phase, dispensing device 202 passes over substrate 206 and dispenses a first layer of flowable edible material 208 to form a base portion or base layer 208a of object 226. In other words, the initial pass places flowable edible material 208 in direct contact with the surface of substrate 206. Once flowable edible material 208 contacts substrate 206, it may dry and/or cool to a non-flowable phase or state and become a non-flowable edible material.

[0252] In an embodiment, object 226 may be a 3-D advertising indicia 228 built upon edible substrate 206 which may be a stick of chewing gum as shown in Figures 13A-13C. In an embodiment, flowable edible material 208 may be any confectionery material or chewing gum component having a non-flowable or solid state at ambient conditions or be dispersed or dissolved in a solution that may dry, at ambient, to a non-flowable or solid state. Nonlimiting examples of suitable edible materials include any confectionery material that may be placed in a fluid or flowable state as described herein. Further suitable materials for the edible material include elastomers; resin tackifiers; waxes; fats; mineral fillers; polysaccharides; gelatin;

sugars; softeners such as glycerin, lecithin; hydrocolloids such as gum arabic, guar gum, cyclodextrin, celluloses, carrageenan, and agar; starch; and pectins. In addition, edible material 208 may be any ink component and/or organoleptic component as previously described herein. Dispensing device 202 may dispense ink, organoleptic components, from respective dedicated nozzles or jets. Alternatively, a single dispensable fluid may be prepared containing a plurality of desired edible materials. This single fluid may then be selectively dispersed from the dispensing device to form object 226.

[0253] During a middle phase of object formation, dispensing device 202 may apply middle layer of edible material 208b onto substrate 206 as shown in Figure 13B. It is understood that layer 208b may be a single layer or a plurality of layers. During the middle phase, dispensing device jets additional edible material 208 onto layer 208a to form additional middle layer or layers 208b on object 226. Layer 208b builds-up or increases the height of object 226. In an embodiment, application of layer 208b further defines the size and shape of advertising indicia 228. For example, with middle layer 208b, voids in the application of edible material are visible. As can be seen from Figure 13B, the voids correspond to the text DOUBLEMINT in advertising indicia 228.

[0254] During a final phase of object formation, dispensing device 202 may apply a top layer 208c onto layer 208. It is understood that top layer 208c may include one or more individual layers of edible material 208. Top layer 208c may complete formation of 3-D object 226. Multiple layers 208a, 208b, and 208c thereby form a multiple layered structure which correspondingly forms 3-D object 226. In an embodiment, application of top layer 208c onto discrete areas of middle layer 208b completes the formation of the text voids and further completes the shape and size of advertising indicia 228. One of ordinary skill in the art will realize that base layer 208a and/or middle layer 208b may also be the top layer at certain portions of object 226 where a middle layer and/or a top layer are not applied as desired. 3-D object 226 may be formed on a single surface of edible substrate 206 or on each of the opposing surfaces of substrate 206.

[0255] In a further embodiment, the amount of edible material 208 applied to form layers 208a, 208b, 208c may vary at different areas of object 226 as desired. In

an embodiment, the layer heights may be adjusted to form 3-D advertising indicia 228 a height I greater at arrowhead ends 230, 232 than a height J in a middle portion 234 of the advertising indicia as shown in Figure 13C. The composition of edible material 208 may be varied to form a 3-D object having any color, ingredient, texture, and/or flavor, as desired. In a further embodiment dispensing device 202 may be used to add layer(s) of edible material to any type of embossment (e.g., protrusion, indentation) present on the substrate. In an embodiment, edible material 208 may be added to an indentation present on edible substrate 206. The edible material may coat the indentation. Thus, the 3-D object may be considered the coating of the indentation.

[0256] In an embodiment, edible product 240 may include edible substrate 242 and 3-D object 244 disposed thereon. Object 244 may be a 3-D representation of an image such as a landscape or mountain range as shown in Figures 14A and 14B. Object 244 may be layer-formed onto edible substrate 242 using dispensing device 202 and may include a plurality of colors and a plurality organoleptic components. For example, edible component 240 may be dispensed to form mountain bases 246. Dispensing device 202 may also eject first color(s) and first organoleptic component(s) 250a during formation of mountain bases 246. During layer-by-layer formation of mountain tops 248, dispensing device 202 may eject or jet second color(s) and/or second organoleptic component(s) 250b. In an embodiment, the first organoleptic component may correspond to the mountain bases 246 and the second organoleptic component may correspond to the mountain tops 248 as previously discussed herein.

[0257] In an embodiment, apparatus 200 may produce a multiple phase edible product. The hopper 210 may be a source of a molten gum base composition with the dispensing device 202 in fluid communication with the source. The dispensing device 202 may be used to spray particles of the molten gum base composition on the edible substrate.

[0258] The hopper 210 may be any receptacle, container, storage device, or the like capable of being heated and maintaining the gum base component in a molten state. The hopper 210 may contain one or more heating elements in addition to a stirring device. The dispensing device 202 may be any dispensing device as previously described herein. In an embodiment, the dispensing device 202 may include any nozzle and suitable pressurization system to spray, jet, print, or disperse

particles of the molten gum base component from the nozzle under pressure. The spray profile for the molten gum base particles may be any spray profile as commonly known in the art including such nonlimiting examples as cone spray and fan spray. A nonlimiting example of a suitable dispensing device includes a valve-jet spraying device.

[0259] In an embodiment, the dispensing device may be a non-contact dispensing device. As used herein, a “non-contact” dispensing device is a device which applies a composition to a substrate without the dispensing device touching a surface of the substrate to which the composition is applied. Thus, no part of the dispensing device 202 touches the surface of the edible substrate 264. Nonlimiting examples of suitable non-contact dispensing device include any non-contact printing device disclosed herein. In an embodiment, the dispensing device 202 is an inkjet printing device.

[0260] In an embodiment, the edible material 208 may be a gum base composition. The gum base composition is one or more of the following chewing gum base ingredients: elastomer, resin, softener, and wax. The chewing gum base composition has a liquid state and a solid state. As used herein, “molten” is the chewing gum base composition in liquefied form. As used herein, a “melted” chewing gum base composition is the chewing gum base composition in solid form that has been previously placed in a molten state or a liquefied phase. Thus, a molten gum base composition is a liquid at or above the melting temperature of the gum base composition. The melted gum base composition is a solid, the melted gum base composition having been previously liquefied and heated to at least its melting point temperature. One of ordinary skill in the art will recognize the melted chewing gum base composition is distinguishable over typical extruded chewing gum. When chewing gum is prepared, it is typically heated to a temperature from about 40°C to about 55°C during mixing and heated to a temperature from about 30°C to about 45°C during extruding. Chewing gum is not melted or heated to a liquefied or a molten state during production thereof.

[0261] The gum base composition may be any combination of one or more elastomers, resins, softeners, and/or waxes. The elastomer may be any natural or synthetic elastomer as is commonly known in the art. Nonlimiting examples of

suitable natural elastomers include natural rubber such as smoked or liquid latex and guayule as well as natural gums such as jelutong, lechi caspi, perillo, sorva, massaranduba balata, massaranduba chocolate, nispero, rosindinha, chicle, gutta hang kang, and combinations thereof. Nonlimiting examples of suitable synthetic elastomers include polyisobutylene with a GPC weight average molecular weight of about 10,000 to about 95,000, isobutylene-isoprene copolymer having styrene-butadiene ratios of about 1:3 to about 3:1, polyvinyl acetate having a GPC weight average molecular weight of about 2,000 to about 90,000, polyisoprene, polyethylene, vinyl acetate-vinyl laurate copolymer having vinyl laurate content of about 5 to about 50 percent by weight of the copolymer, and combinations thereof. Thus, the molten gum base composition including an elastomer will have a temperature greater than or equal to the melting temperature of the elastomer.

[0262] Nonlimiting examples of suitable resins include natural rosin esters, often called ester gums, such as glycerol esters of partially hydrogenated rosin, glycerol esters polymerized rosin, glycerol esters of partially dimerized rosin, glycerol esters of rosin, pentaerythritol esters of partially hydrogenated rosin, methyl and partially hydrogenated methyl esters of rosin, pentaerythritol esters of rosin, synthetics such as terpene resins derived from alpha-pinene, beta-pinene, and/or d-limonene, and combinations thereof. The molten gum base composition including a resin will have a temperature greater than or equal to the melting temperature of the resin.

[0263] Nonlimiting examples of suitable softeners include tallow, hydrogenated tallow, hydrogenated and partially hydrogenated vegetable oils, cocoa butter, glycerol monostearate, glycerol triacetate, lecithin, mono-, di- and triglycerides, acetylated monoglycerides, fatty acids (e.g., stearic, palmitic, oleic and linoleic acids), and combinations thereof. The molten gum base composition including a softener will have a temperature greater than or equal to the melting temperature of the softener.

[0264] Nonlimiting examples of suitable waxes include any aliphatic wax, any polyolefin wax, carnauba wax, bees wax, candela wax, microcrystalline wax, and combinations thereof. The molten gum base composition including a wax will have a temperature greater than or equal to the melting temperature of the wax.

[0265] The base 204 may be placed on a transport device to move the edible substrate 206 under the dispensing device 202. Alternatively, the base 204 may be



stationary and the dispensing device 202 may be moveable with respect to the base as previously discussed.

[0266] The dispensing device 202 may be used to produce edible product 260 by spraying particles 262 of the molten gum base composition onto the edible substrate 264 to form a multiple phase edible product as shown in Figures 14C-14H. The edible substrate 264 may be any edible substrate as previously disclosed herein. The molten gum base composition readily adheres to the edible substrate, fusing and/or bonding to the surface of the edible substrate upon contact therewith. Upon cooling, the molten gum base composition solidifies to become the melted gum base composition 265. Cooling time for the molten gum base composition may vary based on the ingredients of the molten gum base composition. Cooling of the molten gum base composition may be instantaneous, or substantially instantaneous, upon contact with the edible substrate 264. Alternatively, the molten gum base composition may cool gradually once in contact with the surface of the edible substrate 264.

[0267] The molten gum base composition particles 262 may be sprayed onto one or all of the surfaces of the edible substrate 264. In an embodiment, the dispensing device 202 may spray the particles 262 to form a layer 266 on the edible substrate 264 as shown in Figure 14D. The layer 266 may be a uniform dispersion of the particles 262 so as to form a continuous, integral layer of the melted chewing gum composition 265 that is coextensive, or substantially coextensive, with the surface of the edible substrate 264. The layer 266 may have a uniform thickness along the length thereof. Alternatively, the layer 266 may have a thickness which varies along the length of the layer.

[0268] The spray parameters for the dispensing device may be adjusted to modify the surface texture of the layer 266 as desired. The layer 266 may have a regular or smooth surface texture as shown in Figure 14D. Alternatively, the layer 266 may have a rough, a rugged, or an irregular surface texture.

[0269] The opposing side of the edible substrate 264 may be sprayed with the particles 262 to form a layer 268 in a similar manner. This provides the edible product 260 with a multiple layer structure (layer 266/edible substrate 264/layer 268). The thickness of the layers 266, 268 may be from about 0.0001 inches to about 0.1 inches, or any value therebetween. In an embodiment, the presence of layer 266 and/or layer

268 may give the edible product 260 the appearance of a co-extruded product. The composition of the layers 266,268 may be the same or different.

[0270] In an embodiment, the dispensing device 202 may repeat the spraying procedure to spray a second application of the particles 262 and form a second layer of the molten gum base material on the layer 266. This layer-by-layer application of the molten gum base composition may be repeated until a final desired thickness for layer of the melted gum base composition is obtained. Thus, the layer 266 may be the compilation of a plurality of sublayers, the sublayers sprayed one upon the other in a layerwise manner. The layer 268 may be a “built-up” layer of sublayers in a similar manner.

[0271] In an embodiment, the dispensing device 202 may spray the particles 262 at discrete locations on the edible substrate 264 to form edible product 260a having one or more objects 270 of the melted gum base composition as shown in Figure 14E. The objects 270 may have any shape as desired including such nonlimiting examples as a geometric shape, a fanciful shape, lines, and combinations thereof. In an further embodiment, the molten gum base composition may be applied to the edible substrate to form a 3-D object as previously discussed.

[0272] In an embodiment, the melted gum base composition 265 may include one or more organoleptic components. The melted gum base composition 265 may be colored as desired. In a further embodiment, the melted gum base composition 265 may include a sweetening agent, a flavoring agent, and a color. For example, the layer 266 may contain from about 30% to about 100% by weight (or any value therebetween) of the melted gum base composition and from about 0% to about 70% by weight (or any value therebetween) of one or more organoleptic components.

[0273] An additional organoleptic component may be dispensed on the edible substrate 264 and/or on the melted gum base composition 265. Alternatively, the melted gum base composition may contain no organoleptic component, with an organoleptic component being dispensed onto the edible substrate 264 (or onto the melted gum base composition 265) as previously discussed herein.

[0274] In an embodiment, an edible ink-indicia 272 may be printed on the edible substrate 264 and/or the melted gum base component 265 as previously discussed herein. The edible ink-indicia 272 may contain the organoleptic component

as previously discussed. The edible ink-indicia 272 may be a non-contact printed edible ink-indicia or an inkjet edible ink-indicia. The edible ink-indicia 272 may have a feature as previously discussed herein. In an embodiment, the feature of the edible ink-indicia 272 may correspond to a property of the melted gum base composition 265 and/or a property of the edible substrate 264. For example, the edible ink-indicia 272 may be a word (i.e., “fuse”) and the feature may be a meaning of the word, the meaning of the word corresponding to a property of the melted gum base composition 265 (i.e., the connection between the feature and the property being that the melted gum base component 265 is bonded or is “fused” to the edible substrate 264).

[0275] In an embodiment, the controller 224 and the dispensing device 202 may be operatively connected to each other as well as in operative communication with sources for each individual ingredient of the gum base composition. The controller 224 and the dispensing device 202 may be in operative communication with sources of one or more organoleptic components in a similar manner. The controller 224 may be configured with suitable software and/or logic to permit a user to control and adjust the ingredients of the gum base composition as the molten gum base composition is sprayed onto the edible substrate.

[0276] For example, in a production process, the operator may spray a first molten gum base composition composed of an elastomer on a first portion (or a first batch) of the edible substrate, this first molten gum base composition having a first flavor and a first color. By way of the controller 224, the operator may then select a second molten gum base composition (composed of a resin and a wax, for example), and spray this second molten gum base composition on a second portion (or a second batch) of the edible substrate. The second molten gum base composition may include a second organoleptic component profile (second flavor, second color). In this way, the apparatus 200 provides the operator with real-time capability to change the ingredients of the molten gum base composition. Similarly, the apparatus 200 may also provide real-time capability to change the organoleptic profile. The operator may change the ingredients of the gum base composition substantially instantaneously, with no, or substantially no, interruption in the spraying of the molten gum base composition. Apparatus 200 thereby enables the production of a customized or a tailor-made edible product.

[0277] In an embodiment, the apparatus 200 may be used to produce a chewing gum product 280 as shown in Figure 14H. Figure 14F shows a chewing gum product 282 having a predetermined thickness TT. Chewing gum products such as chewing gum sticks, tabs, and pellets typically have a predetermined thickness as is commonly known in the art. For example, a chewing gum stick typically has a thickness from about 0.068 inches to about 0.072 inches, a chewing gum tab typically has a thickness from about 0.135 inches to about 0.145 inches, and a chewing gum pellet typically has a thickness from about 0.156 inches to about 0.200 inches. Figure 14G shows a chewing gum substrate 284 having a thickness UU, thickness UU being less than the predetermined thickness TT (depicted in phantom). Dispensing device 202 may spray particles of the molten gum base composition onto the chewing gum substrate 284 to form a layer 286 of the melted gum base composition 288 so that the final thickness of the chewing gum product 280 is the predetermined thickness TT as shown in Figure 14H. The layer 286 may be a plurality of sublayers formed by way of repeated spraying as previously discussed. One or both surfaces of the chewing gum substrate 284 may be sprayed with the molten gum base composition to obtain the thickness TT. Any surface of the chewing gum composition 280 may be printed with an edible ink-indicia as disclosed herein. Similarly, an organoleptic component may be dispensed on the chewing gum product 280.

[0278] Application of the melted gum base composition 288 to form the edible product 280 may advantageously permit the production of a chewing gum product that requires less chewing gum starting material compared to conventional chewing gum products. This may advantageously reduce production costs. The chewing product 280 contains less chewing gum while simultaneously having a standard thickness. This makes the chewing gum product 280 compatible with conventional chewing gum wrapping devices and packaging devices. The molten/melted gum base composition may advantageously be used to reduce the cost of chewing gum production, to produce customized chewing gum products, and to add organoleptic components (chocolate, for example) that cannot be added chewing gum exposed to an extrusion process during production.

[0279] In an embodiment, a method for selling an edible product is provided. The method includes providing an edible product and printing an ink-indicia

associated with an event on the edible substrate to form an event product. The event product may then be distributed to a consumer.

[0280] The edible product may be any edible material or edible substance as previously described herein. Similarly, the ink-indicia may be any ink-indicia as previously described. The ink-indicia may be associated with an event. In other words, the ink-indicia may be any indicia that corresponds to, identifies, emphasizes, highlights, describes, details, augments, accentuates, links, denotes, or suggests, a particular event. The ink-indicia may be applied to the edible product to form the event product by any method as herein described. In an embodiment, the ink-indicia may be ink jet printed upon a surface of the edible product. In a further embodiment, the ink-indicia may include an organoleptic component. Provision of the event product advantageously piques a consumer's interest in the edible product that otherwise may not be linked to an event. Associating an edible product with a particular event may establish a new market segment for the edible product and correspondingly increase sales of the product. Indeed, the event product may also be considered a novelty item and advantageously become a consumer collection item.

[0281] The event may be any occurrence, happening, activity, social activity, affair, celebration, ceremony, incident, that may be identifiable by a person or a consumer. The event may be an international activity (i.e., the Olympics or World Cup) or a nationally recognized event (i.e., presidential election) known or identifiable to a large number of people. Alternatively, the event may be known to only a small segment of society or a small number of people, club or private organization, such as a trade show or a family reunion, for example. The event may be a personal event (an anniversary, a graduation, an achievement, a wedding, an engagement). Nonlimiting examples of suitable events include a current event (such as a hostage being freed); a sports event; a holiday (St. Valentine's Day, the Fourth of July), a religious event, a political event such as a campaign, a speech, or a local, regional, state, or federal election; a judicial ruling (Martha jailed!); a seasonal event such as the Grammys or the Oscars; a cultural event such as a music performance, an art exhibit, a movie, or a television program; and combinations thereof.

[0282] The event product may distributed or otherwise provided to a consumer or potential consumers as is commonly known in the art. Nonlimiting examples of

suitable distribution or ways by which the event product may be made available to or delivered to consumers includes distribution to retail stores, purchase or ordering from Internet sites, catalogs, mailings, and free sample product distributions.

[0283] In an embodiment, the distribution of the event product may occur during a time period of before the event, during the event, or after the event. For example, event product 300 includes edible product 302 and an ink-indicia 304 associated with a cultural event, namely a music concert as shown in Figures 15A and 15B. In an embodiment, edible product 302 may be a confectionery product or a chewing gum product. Ink-indicia 304 may be an ink-jetted indicia printed upon the surface of event product 300. Furthermore, ink-indicia 304 may be associated with the event by providing text identifying the musical group, the date, and the location of the event. Event product 300 may include feature 306, such as an image of a music performer. Feature 306 may be on the same side as ink-indicia 304 or on an opposing side of the event product as shown in Figure 15B.

[0284] In an embodiment, event product 300 may be distributed, made available to, and sold to consumers before the event (i.e., before the musical performance). For example, event product 300 may be available and/or displayed at vending stands or vending machines, or by vendors located at the concert hall where the musical performance is to occur. Indeed, event product 300 may thereby be distributed or otherwise be available to consumers before, during, and after the musical performance at the event venue.

[0285] In an embodiment, the method may include awaiting a result of the event and printing the result on the edible product. The resultant event product may then be distributed to consumers within a short time period after the result or occurrence of the event. As shown in Figure 16, event product 310 includes edible product 312 and ink-indicia 314 associated with a sports event. Ink-indicia 314 may be text that associates the ink-indicia to the sports event by identifying the sports event and the teams participating therein. Ink-indicia 314 may also include a result of the event 316, such as a score. Event product 310 may further include features 318a, 318b, such as first and second team colors (e.g., green and gold) of the victorious team. Features 318a, 318b may further accentuate or emphasize the event and/or the result.

[0286] In an embodiment, the production of event product 310 may occur immediately upon completion of the result and/or the event. In an embodiment, the result may be printed on the edible substrate within about one second to about 24 hours of the occurrence of the result. Event product 310 may then be quickly distributed and/or made available to consumers shortly after completion of the event. In an embodiment, event product 310 may be produced and distributed to consumers within less than several days, or less than 24 hours or within 1 minute to about 24 hours after the occurrence of the event and/or event result. The event need not be limited to a sports event. One of ordinary skill in the art will recognize that the method may be readily applicable to political elections, current events, movie premieres and other events with time-sensitive results associated therewith.

[0287] The skilled artisan will appreciate the advantages offered by rapidly producing and distributing an edible product associated with an event to consumers shortly after completion of the event. Provision of event product 310 to consumers within 24 hours of an event (particularly an event with a time-sensitive result such as a sports score, election result or current event) advantageously increases sales of the edible product by providing the product when consumer attention is focused on the event. Provision of a time-sensitive event result (such as a sports score) with the event product further grabs consumer attention of the product translating into increased sales of the product. Thus, the conversion of a conventional edible product into an event product may increase sales of the current product. Relating a conventional edible product to an event may also expand the market segment of the product and increase the number of target consumers for the edible product vis-à-vis the event product.

[0288] In an embodiment, a method of advertising is provided. The advertising method entails providing an edible product and printing an ink-indicia associated with an event on the edible substrate to form an event product. The method further includes providing an advertising indicia on the event product to form an event product advertisement. The advertising indicia may be applied with the ink-indicia. Alternatively, the advertising indicia may be provided either before or after application of the ink-indicia. The advertising indicia may or may not be an ink jet print indicia. The event product advertisement may be distributed before, during, and/or after an event as previously discussed.

[0289] In an embodiment, event product advertisement 320 includes an edible product 322 and an ink-indicia 324 associated with an international event, such as the Olympics for example, disposed on a first side of the edible product as shown in Figure 17A. In an embodiment, edible product 322 may be a confectionery or a chewing gum product. Ink-indicia 324 may be associated with the event by way of a symbol 326, such as the Olympic rings, as well as text 328 identifying the location and time of the event. Event product advertisement 320 may also include a result 330 that occurred during the event (i.e., silver medal for skater Sasha Cowen).

[0290] An advertising indicia 332 may be disposed on another side of edible product 322 as shown in Figure 17B. In an embodiment, advertising indicia 332 may be ink jet printed upon the edible product 322. Advertising indicia 332 may be any advertising indicia as described herein and may include one or more features and one or more organoleptic components corresponding to the respective features. In an embodiment, event product advertisement 320 may be packaged in transparent packaging as previously discussed.

[0291] In an embodiment, a confectionery product 510 is provided as shown in Figure 18. The confectionery product 510 may include an edible substrate 512 having a first surface 513 and an edible ink 516 dispensed from a printing device 520 onto the first surface 513 of the edible substrate 512 forming an edible ink-indicia 518. In this embodiment, the edible substrate may also have a second surface 514 opposing the first surface 513. The edible ink 516 may be applied to one or both of the surfaces 513, 514. Moreover, the edible ink 516 may be applied to one or both surfaces 513, 514 so as to cover at least about 5% of either or both surfaces 513, 514, or from about 5% to about 100% of either or both surfaces 513, 514 or any value therebetween. In an embodiment, the edible ink 516 may cover at least about 50% of either or both surfaces 513, 514, or from about 50% to about 100% of either or both surfaces 513, 514 or any value therebetween. In a further embodiment, the edible ink 516 may cover from about 75% to about 100% or about 75%, of either or both surfaces 513, 514 or any value therebetween. In yet another embodiment, the edible ink 516 covers about 100%, or 100%, of either or both surfaces 513, 514.

[0292] As is also shown in Figure 18, the printing device 520 for printing the edible ink 516 is used to apply the edible ink 516 onto the surface of the edible



substrate 512 to form the edible ink-indicia 518. A transport device such as a conveyor (not shown) may move the edible substrate 512 under the printing device 520 as shown by direction arrow AA. Alternatively, the edible substrate 12 may be stationary with the printing device 20 being movable over the edible substrate 512.

[0293] The printing device 520 may be any non-contact printing device disclosed herein. For example, the non-contact printing device may be a spray device. In an embodiment, the printing device 520 may be an edible inkjet printing device. Similarly, the edible ink 516 may be an edible inkjet ink as discussed herein. It is understood that the printing device 520 may be configured to dispense or jet ink compositions or other fluids therefrom. Indeed, any jettable fluid may be dispensed from printing device 520. A “jettable” fluid or material may be any material (solid or liquid) that has properties sufficient to allow the material to be selectively deposited by an inkjet material dispenser as is commonly known in the art. Inkjet printing is advantageous, particularly with respect to comestibles as it provides 1) high resolution printing and 2) non-contact with the comestible thereby avoiding the risk of damage to the confectionery product.

[0294] The printing device 520 may include one or more printing heads 522 in fluid communication with one or more or more reservoirs 524 by way of a channel 526, as shown in Figure 18. The reservoirs 524 may contain an edible ink so that the printing device 520 may print an edible ink onto an edible substrate. The printing device 520 may be configured with more than one reservoir 524, each reservoir 524 containing an edible ink in typical colors such as cyan, magenta, yellow, and black or white in order to provide multiple color images and depending on the number of colors desired. Similarly, in an embodiment, the printing device 520 may be configured with four printing heads 522. Each printing head 522 may include one or more nozzles as previously discussed herein. Each printing head 522 may be in fluid communication with one or more fluid reservoirs 524. The printing heads 522 may be arranged in any desired manner to deliver an edible ink-indicia onto an edible substrate. For example, the printing heads 522 may be arranged in a single line. Alternatively, the printing heads 522 may be arranged in a series of lines to form a matrix-type printing profile. The printing device 520 may be a single pass or a multiple pass printing device to form a single-color or multiple-color image onto an edible substrate. In an embodiment, the

printing device 520 is a single pass device that traverses an edible substrate once during printing.

[0295] The printing device 520 may consist of any number of color-jets in an assembly. More specifically, the printing device may consist of a four-color jet assembly in an eight wide by four deep arrangement. In an embodiment, the printing device 520 may include 256 nozzles per 2.8 inches (vertical), or about 91 nozzles in the vertical direction. The width of each ejected dot may be from about 0.0166 inches to about 0.0037 inches (horizontal). In other words, the ink may be dispersed in the horizontal direction from about 60 dots per inch to about 400 dots per inch or any value therebetween. The drop volume of the edible ink through the print heads may be approximately 80 pL. The skilled artisan will appreciate that the ink concentration is dependent upon 1) the rate or speed in which the edible substrate 512 passes under the printing device 520 and 2) the rate in which the print head assembly ejects the ink droplets. Thus, the printing device is capable of ejecting 36,400 dots per square inch (91 vertical x 400 horizontal). The dot concentration upon the edible substrate 512 may be varied as desired. For example, operating the print head at about 10% capacity yields an ink concentration of about 3600 dots per square inch. In another example, operating the print head assembly at 25% capacity yields an ink concentration of 9100 dots per square inch on the edible substrate 512. Thus, the dot concentration upon the edible substrate 512 may be from about 3600 dots per square inch to about 36,400 dot per square inch, or any value therebetween.

[0296] In an embodiment, the printing resolution may be from about 60 dots per inch to about 400 dots per inch or any value therebetween. In an embodiment, the printing resolution may be from or about 60 dots per inch to about 120 dots per inch, or about 100 dots per inch per color.

[0297] Any of the printing devices described herein may print have high resolution printing capacity. As used herein, "high resolution" is a horizontal dot concentration greater than 100 dpi to about 400 dpi, or any value therebetween. Thus, a non-limiting example of a high resolution image is an image having a dot concentration from about 9100 dots per square inch (91 vertical nozzles x 100 dpi) to about 36,400 dots per square inch (91 vertical nozzles x 400 dpi), or any value therebetween.

[0298] It is understood that the edible ink 516 may be compatible with the printing device 20 so as not to damage any printing head components or cause inconsistent firing of jets. The edible ink 516 may also be compatible with the edible substrate 512 to provide a high resolution edible ink-indicia 518 that adheres to the edible substrate 512.

[0299] In an embodiment, the printing device 520 delivers the maximum amount of artificial colorants allowed by a regulatory agency such as the FDA, EEC or similar governmental agency. Thus, provision of the edible substrate 532 with the edible ink 536 applied thereto yields a confectionery product with all, or substantially all, of the color on the outer surface. This advantageously provides a confectionery product having an extremely vibrant color that is both aesthetically pleasing and highly attractive to consumers.

[0300] Figure 19 illustrates a confectionery product 530 having an edible substrate 532 and an edible ink 536 printed thereon. The edible substrate 532 may comprise a body 533, a first surface 534 and a second surface 535, where the surfaces 534, 535 are located on opposite sides of the edible substrate 532. The edible ink 536 may be applied to one or both of the surfaces 534, 535. Moreover, the edible ink 536 may be applied to one or both surfaces 534, 535 so as to cover at least about 5% of either or both surfaces 534, 535, or from about 5% to about 100% of either or both surfaces 534, 535 or any value therebetween. In an embodiment, the edible ink 536 may cover from about 50% to about 100% of either or both surfaces 534, 535 or any value therebetween. In another embodiment, the edible ink 536 may cover from about 75% to about 100% of either or both surfaces 534, 535 or any value therebetween. In yet a further embodiment, the edible ink 536 may cover about 100%, or 100%, of either or both surfaces 534, 535.

[0301] The edible ink 536 may form an edible ink-indicia 538. Edible ink-indicia 538 may be any edible ink-indicia desired. The edible ink-indicia 518 may be any single color or multiple color edible ink or ink composition as discussed herein. Further, the edible ink-indicia 518 may also be directed toward certain events and/or advertising. The event may be any event as previously disclosed herein and may further include any occurrence, happening, activity, social activity, affair, celebration, ceremony, incident, that may be identifiable by a person or a consumer. The event

may be an international activity (i.e., the Olympics or World Cup) or a nationally recognized event (i.e., presidential election) known or identifiable to a large number of people. Alternatively, the event may be known to only a small segment of society or a small number of people, club or private organization, such as a trade show or a family reunion, for example. Non-limiting examples of suitable events include a current event (such as a hostage being freed); a sports event; a holiday (St. Valentine's Day, the Fourth of July), a religious event, a political event such as a campaign, a speech, or a local, regional, state, or federal election; a judicial ruling (Martha jailed!); a seasonal event such as the Grammys or the Oscars; a cultural event such as a music performance, an art exhibit, a movie, or a television program; and combinations thereof.

[0302] Moreover, the edible ink-indicia 518 may be any edible ink-indicia as disclosed herein. The edible ink-indicia 518 may be an inkjet-indicia. The edible ink-indicia may include any feature as disclosed herein. For example, the edible ink-indicia 548 may include a green shamrock 547 for marketing during St. Patrick's Day, as is shown in Figure 20, and discussed herein below. The feature may include a portion of or all of the edible ink-indicia 518. In an embodiment, any organoleptic component as previously discussed herein may be dispensed on the edible substrate.

[0303] Further, each letter and/or word in the edible ink-indicia 518 may be considered an individual feature as the size, font, layout and design of each letter/word may be varied as desired. Each letter or word may be printed with single or multiple colors that may be the same or different than the color(s) used to print the other letters or words. For example, the letters "WUBMV" may be one color, while the letters may be outlined in another color, such as white. As shown in Figure 19, the unprinted portion 531a of the first surface 534 of the substrate 532 may remain unprinted or may be another color such as, for example, yellow. Portions 531b, 531c, 531d, 531e may be other colors as desired to produce a multiple colored confectionery product. In an embodiment, confectionery product 530 may include four colors (such as yellow, red, blue, and black) in addition to uncolored portion 531a.

[0304] One having ordinary skill in the art will appreciate that the coloring, shading, texture, size, shape, etc., may vary depending on specific embodiments or market demand, for example. Further, the term "JUICY FRUIT" may be presented in

a decorative font, color, layout and design that is different from earlier packaging designs. The ability of a manufacturer to vary the features of the edible ink-indicia may help to draw the consumer's attention to the product, thereby increasing consumer appeal in the product.

[0305] As is further illustrated in Figure 19, in an embodiment, the edible ink 536 does not extend through the body 533 of the edible substrate 532, and therefore is not visible on the second surface 535 of the edible substrate 532. For example, the edible ink 536 may absorb a certain distance 539a into the edible substrate 532. However, the edible ink 536 does not absorb through the entire thickness 539 of the edible substrate 532. In other words, since the edible ink 536 does not extend completely through the body 533 of the edible substrate 532, one having ordinary skill in the art would recognize that the edible ink 536 would not be visible on the second surface 535 of the edible substrate 532 if the edible ink 536 were applied only to the first surface 534.

[0306] In an embodiment, the edible ink 536 may absorb a distance 539a that is about 1% to about 25%, or about 10%, or any value therebetween of the thickness 539 of the edible substrate 532. Similarly, the edible ink 536 may absorb a distance 539a that is about 5% to about 50% of the thickness 539 of the edible substrate 532. For example, typical sticks of chewing gum have thicknesses of about 0.068 inches for sugarless chewing gum sticks and about 0.072 inches for chewing gum sticks including a sugar component. Therefore, with a sugarless stick of chewing gum, the edible ink 536 may absorb a distance 539a that is about 0.00068 inches to about 0.017 inches, or about 0.0068 inches, or any value therebetween, or about 0.0034 inches to about 0.034 inches of the thickness 539 of the edible substrate 532. Similarly, with a chewing gum stick having a sugar component, the edible ink 536 may absorb a distance 539a that is about 0.00072 inches to about 0.018 inches, or about 0.0072 inches, or any value therebetween, or about 0.0036 inches to about 0.036 inches of the thickness 539 of the edible substrate 532. As a further example, typical chewing gum tabs have thicknesses of about 0.141 inches and typical chewing gum pellets have thicknesses of about 0.156 inches. Therefore, with a chewing gum tab, the edible ink 536 may absorb a distance 539a that is about 0.00141 inches to about 0.03525 inches, or about 0.0141 inches, or any value therebetween, or about 0.00705 inches to about

0.0705 inches of the thickness 539 of the edible substrate 532. Similarly, with a chewing gum pellet, the edible ink 536 may absorb a distance 539a that is about 0.00156 inches to about 0.039 inches, or about 0.0156 inches, or any value therebetween, or about 0.0078 inches to about 0.078 inches of the thickness 539 of the edible substrate 532.

[0307] In an embodiment, and in order to prevent edible ink 536 from extending through body 533 of the edible substrate 532 and being visible on the second surface 535 of the edible substrate 532 (that is, to prevent the edible ink 536 from being visible on surface 535), the edible ink 536 may be printed on the edible substrate 532 at a dot resolution of less than about 100 dots per inch, as will be discussed herein.

[0308] In an embodiment, the confectionery product 530 shown in Figure 19 includes an edible ink-indicia 538 including the letters “WUBMV,” an acronym for the phrase “Will You Be My Valentine.” Because the product 530 is associated with St. Valentine’s Day, the product 530 may be marketed prior to St. Valentine’s Day to increase consumer appeal associated with the product 530. The edible ink-indicia 538 may further include an advertisement such as the term “JUICY FRUIT” text in decorative font with the double-headed fanciful arrow symbol 37 associated therewith. One of ordinary skill in the art will appreciate the myriad of possibilities by which the ink-indicia printed upon the confectionery product may be associated with an event (such as a holiday).

[0309] Figure 20 also shows a confectionery product 540 similar to the confectionery product 530 in Figure 19 but having an edible ink-indicia 548. The edible ink-indicia 548 of Figure 20 is directed toward St. Patrick’s Day as is evidenced by the indicia 547 of a shamrock. The product 40 also includes an advertisement for a specific brand of chewing gum, Winterfresh, as is shown by the edible ink 546. In an embodiment, the edible ink 546 may cover from about 80% to about 95% of the edible substrate 542. Further, the lettering of the word Winterfresh may be one color, the shamrock 547 may be another color, and the remaining portion of the edible substrate 542 outside of the letter tracing 541 may be another color. One of ordinary skill in the art will recognize that colors, lettering, textures, etc. may change depending on specific embodiments or market demand. Further, the edible ink-indicia 548 may

include a feature and/or an organoleptic component as previously described herein. For example, the shamrock 547 may have green coloring and may have an added breath freshening agent or mint flavor deposited thereon.

[0310] Figure 21 illustrates a stick of chewing gum 550 having a co-extruded or multi-layered appearance. In an embodiment, the chewing gum 550 includes an edible substrate 552, a first surface 554 and a second surface 556. When an edible ink 558 is applied to about 100%, or 100%, of the first surface 552 of the chewing gum 550, the edible ink 550 may be allowed to absorb partially into the edible substrate as shown by the absorbed distance 559. Therefore, a side view or cross-sectional view of the chewing gum 550 reveals the color of the edible ink 558 that has absorbed partially through the edible substrate 552 and gives the chewing gum 550 the appearance of having two layers and the appearance of a co-extruded product. For example, if the edible ink 558 is colored blue and the edible substrate 552 is colored white, the chewing gum 550 will appear to have been co-extruded from a batch of chewing gum colored blue and a batch of chewing gum colored white.

[0311] Similarly, Figure 22 illustrates a stick of chewing gum 560 having a co-extruded or multi-layered appearance. In an embodiment, the chewing gum 560 has an edible substrate 562, a first surface 564, and a second surface 566. In this embodiment, however, an edible ink 568 is applied to the entirety of both the first surface 564 and the second surface 566 of the chewing gum 560. That is, about 100%, or 100%, of surfaces 564 and 566 are covered with the edible ink 568. Accordingly, the edible ink 568 may absorb partially into the edible substrate 562 from both surfaces 564, 566 as shown by the numbers 567 and 569, respectively. In this embodiment, therefore, the edible substrate 562 of the chewing gum 560 appears to consist of three separate layers, as is clearly illustrated by the cut-away section of Figure 22. For example, if an edible ink 568 colored blue is printed onto the first surface 564 of the edible substrate 562, an edible ink 568 colored red is printed onto the second surface 566 of the edible substrate 562, and the edible substrate 562 is white, the chewing gum 560 will appear to have been co-extruded from a batch of chewing gum colored blue, a batch of chewing gum colored red, and a batch of chewing gum colored white. Moreover, a chewing gum 560 printed with the colors red, white and blue may be marketed prior to July Fourth to increase consumer appeal

for the chewing gum 560. Alternatively, a chewing gum printed with the colors red, white and blue may also have organoleptic components associated with the colors. For example, if an edible ink 568 colored blue is printed onto the first surface 564 of the edible substrate 562, and an edible ink 568 colored red is printed onto the second surface 566 of the edible substrate 562, the first surface 564 may have a blueberry flavor associated therewith and the second surface 566 may have a strawberry flavor associated therewith.

[0312] In an embodiment, a trim material may be incorporated into the edible substrate. In an embodiment, the edible substrate may contain from about 1% to about 50% by weight trim material or any value therebetween. In a further embodiment, the edible substrate may contain from about 10% to about 20% by trim material. The trim material may be used in conjunction with the edible ink to provide an aesthetically pleasing chewing gum. As used herein, "trim material" is confectionery material that has been used in a previous confectionery product manufacturing process. Trim material may include rework confectionery, scrap confectionery, or a blend of two or more virgin or starting confectionery materials that have come into contact with each other during a previous confectionery production process. In other words, trim material may have been a starting material in a previous confectionery manufacturing process. Trim material is often difficult to recycle or incorporate into a finished confectionery product as the organoleptic characteristics of the trim material may be unpredictable and difficult to control. Consequently, the appearance, taste, smell, color, texture, and mouthfeel of trim material may be unpredictable. This unpredictability of trim material typically results in trim material being discarded. This results in waste and a decrease in product yield. In this situation, edible ink may be used to cover or mask the inconsistencies in the color or texture of the trim material when it is incorporated into a new gum base batch to be re-rolled, scored, packaged and sold. For example, the edible substrates 552 and 562 of Figures 21 and 22 may include trim material that has been printed on with edible ink. Thus, the edible ink 558 may mask or cover any inconsistencies in the edible substrate 552 (Figure 21). Similarly, the edible ink 568 may cover or hide any inconsistencies in the edible substrate 562 (Figure 22). This process may not only provide the consumer with an appealing chewing gum product having a co-extruded or multi-layered look, but may



also improve and increase production economies by allowing reuse of the chewing gum trim to create a final chewing gum product.

[0313] As a further example, Figure 23 shows a stick of chewing gum 570 having a co-extruded or multi-layered appearance. In an embodiment, the chewing gum 570 may have an edible substrate 572, a first surface 574 and a second surface 575. In this embodiment, however, an edible ink 576 may be applied to either surface 574, 575 or both the first surface 574 and the second surface 575 of the edible substrate 572 in a random, wavy pattern. The non-shaded areas 577 represent areas of the edible substrate 572 that were not printed with edible ink 576. However, in the shaded areas that were printed with the edible ink 576, the edible ink 576 may be allowed to absorb partially into the edible substrate 572 from both surfaces 574, 575 as is shown by the numbers 578 and 579, respectively. Figure 23 illustrates that the edible ink 578 may be applied to the edible substrate 572 continuously or intermittently as a printing device traverses the edible substrate 572. One having ordinary skill in the art would recognize that patterns, colors, etc., of the edible ink 576 printed onto the edible substrate 572 are limited only by one's imagination.

[0314] As illustrated, variations on embodiments discussed in the present disclosure are essentially limitless. One having ordinary skill in the art will recognize that features, patterns, colors, shading, texturing, shape, font, layout, design and other characteristics that may be associated with a printed confectionery product may change depending on influences such as personal preferences or market demand. For example, a consumer may be able to utilize the Internet to create his or her own personal design on a confectionery product such as chewing gum yielding a customized product. The consumer may log on to a website maintained by a chewing gum manufacturer and enter the exact words, phrase, coloring, shading, textures, etc., that the consumer wishes to have printed on a confectionery product. The consumer may also provide or send to the chewing gum manufacturer an image, such as a photograph, which the chewing gum manufacturer may non-contact print on a chewing gum. The consumer may also choose one or more organoleptic components to be dispensed on the chewing gum. For example, a consumer may choose the phrase "Happy Birthday, Hunter!" to be printed in red edible ink on a stick of chewing gum with a birthday cake having candles printed beside the font. The chewing gum

manufacturer may subsequently print the phrase on one or more pieces of chewing gum and/or packages, package the printed chewing gum based on the consumer's desires, and deliver the customized gum product to the consumer.

[0315] In an embodiment, a method for producing an chewing product is provided. The method includes providing a consumer with the ability to select an organoleptic component, and producing a chewing gum product with the organoleptic component after the consumer selection. The chewing gum product having the selected organoleptic component is then delivered to the consumer.

[0316] In an embodiment, the method includes providing an Internet site with a list of the organoleptic components. The Internet site is supported by or otherwise hosted by a Web site server as is commonly known in the art. The consumer may visit the Internet site and select one or more desired organoleptic components from the list of organoleptic components displayed on the site. The selected organoleptic component(s) may then be added to the final chewing gum product. The selection by the consumer is then sent to a production facility whereby the selected organoleptic components are added to a chewing gum substrate. The chewing gum substrate may be any chewing gum material as previously discussed herein.

[0317] In an embodiment, a processor generates the list of organoleptic components in a computer-readable medium. The processor may be any data processing device capable of generating the list of organoleptic components as is commonly known in the art. Nonlimiting examples of suitable processors include a computer, a personal computer, a server (such as an Internet server or a Web server), a personal data assistant (i.e., a Blackberry device), and combinations thereof. The processor may include a graphical display, a keyboard, and/or a mouse as is commonly known in the art. The processor may display one or more of any of the aforementioned organoleptic components disclosed herein in the list. Once the consumer selects the desired organoleptic components, the processor receives this selection data and generates instruction data resulting from the consumer input. By way of an interface, the processor transmits the instruction data to a dispensing device. The dispensing device is adapted to receive the instruction data and dispenses the selected organoleptic component(s) onto a surface of a chewing gum substrate to

produce the chewing gum product. The chewing gum product may be wrapped and/or packaged as is commonly known in the art.

[0318] The interface may a computer interface, an Internet connection, a cable connection, a wireless connection, a wireless application interface, and combinations thereof.

[0319] In an embodiment, the method may include providing the consumer with the ability to select and/or design the wrapper for the chewing gum product. The method may also include permitting the consumer to select the color of the chewing gum product.

[0320] In an embodiment, the method may include providing the consumer the ability select to an indicia and producing the chewing gum with the indicia. The indicia may be any of the previously described ink-indicia. In a further embodiment, the consumer may generate, produce, or otherwise create the indicia.

[0321] For example, the consumer may visit the Internet site as discussed above. The consumer may then upload an indicia (such as an image or a photograph in electronic form) to be printed on the chewing gum product. The processor may receive this indicia data and generate indicia printing instructions. The indicia printing instructions may be transmitted by way of the interface to a printing device. The printing device is adapted to receive the indicia printing instructions and prints the indicia on a surface of the chewing gum substrate. The indicia is printed with edible ink which may be a single color or may be multi-colored. The consumer-selected/generated indicia may also be printed on a wrapper or on packaging for the chewing gum product.

[0322] In an embodiment, the printing device is a non-contact printing device. In a further embodiment, the printing device is an ink-jet printing device. Thus, production of the chewing gum product may include dispensing (with a dispensing device) the selected organoleptic component(s) onto a surface of the chewing gum substrate. The production may further include printing (with a printing device) the consumer-provided indicia onto a surface of the chewing gum substrate. In an embodiment, the organoleptic component may be a component of an edible ink as previously discussed. Consequently, the organoleptic component and the indicia may be applied to the chewing gum substrate surface simultaneously, or substantially

simultaneously, with a single printing device. The production of the chewing gum product may also include wrapping and/or packaging the chewing gum product.

[0323] In an embodiment, the production step of the method may occur at a chewing gum production facility or a post-production facility. For example, the method may utilize apparatus 10 as previously discussed herein. Alternatively, the production may occur at a post-production facility which includes a supply of chewing gum substrate, a dispensing device for the organoleptic component, and/or a printing device. The post-production site may also include a packaging device.

[0324] In an embodiment, the chewing gum product may be delivered to the consumer or to an intermediate party such as a distributor, a wholesaler, or to a retail outlet. The method may include mailing the chewing gum product to the consumer, or mailing the chewing gum product to any of the aforementioned intermediate parties. Delivery may also include preparing the chewing gum product for pick-up by the consumer from the production facility, the post-production facility, or from any of the aforementioned intermediate parties.

[0325] In an embodiment, a method of generating revenue is provided. The method includes allowing a consumer to create a custom chewing gum by selecting an organoleptic component, and producing a chewing gum product with the selected organoleptic component. The method may include the consumer paying a fee for the custom production of the chewing gum product. The fee may be based on the number organoleptic components, the amount of chewing gum product desired by the consumer, and combinations thereof. The method of generating revenue may further include allowing the consumer to select an indicia and producing the chewing gum product with the indicia. Production of the custom chewing gum product may be accomplished as discussed above. The method provides a wide array of customization opportunities for the consumer to create an individualized chewing gum product. Thus, the fee may be based on any number of customized features selected by the consumer.

[0326] In an embodiment, a printed confectionery product is provided, the confectionery product having edible ink printed on an edible substrate where the edible ink does not run-off the edible substrate. In other words, the edible ink does not "pool" or collect on top of the edible substrate, and does not bleed-through the edible

substrate. As used herein, “pooling” is the accumulation of excess ink on the substrate surface. “Pooling” may also occur when the edible ink is applied in a manner that is too concentrated, collects on top of the edible substrate and remains moist after application. “Pooling” is problematic because moist or wet ink on a top surface of a first edible substrate may be transferred to the bottom surface of another edible substrate when multiple batches of edible substrates are stacked for further processing and/or packaging.

[0327] Edible ink bleed-through occurs when an edible substrate is thin or porous or when an edible ink concentration is high and the edible ink soaks entirely through the edible substrate and therefore is visible on an opposing surface of the edible substrate. For example, while most inkjet printers are capable of a printing resolution of about 360 dots per inch, use of such a high resolution may cause the edible ink to bleed-through the edible substrate. When manufacturing a confectionery product, unintentional bleed-through is undesirable. If an edible ink absorbs entirely through a stick of chewing gum during processing, the edible ink may cause damage to or mar machinery, stain the structure underlying the chewing gum, damage or mar subsequent batches of chewing gum sticks placed on a stained structure, contaminate underlying chewing gum layers if the gum is stacked after printing, or even mar packaging at the end of the manufacturing process. Consequently, undesirable bleed-through can be a very time-consuming and highly costly problem.

[0328] To prevent a bleed-through of the edible ink through the edible substrate during or after the edible ink is printed onto the edible substrate, a printing resolution of not more than 100 dots per inch may be used. A printing resolution of not more than or about 100 dots per inch may ensure proper coverage of the edible substrate by the edible ink to give the substrate a co-extruded or multi-layered appearance, while at the same time ensuring that the edible ink printed onto the edible substrate does not absorb entirely through the edible substrate to an opposing surface. In other words, application of the edible ink at about 100 dots per inch may help to ensure that the edible ink is absorbed only on the applied surface of the edible substrate. Using a similar dot resolution also allows the surface of the edible substrate to be coated by up to 100% of the surface area. One of ordinary skill in the art will appreciate that the edible ink concentration on the edible substrate surface may vary

based on the composition of the edible substrate. Thus, the print resolution may vary from about 60 dots per inch to about 400 dots per inch, or any value therebetween, or may be about 100 dots per inch, while simultaneously preventing bleed-through.

[0329] In yet another embodiment, methods of producing a confectionery product are provided. For example, in an embodiment, a method of producing a confectionery product comprises the steps of providing an edible substrate; providing a non-contact printing device having at least one printing head for printing edible ink; and printing the edible ink onto a surface of the edible substrate at a dot resolution of less than about one hundred dots per inch, as discussed above. In an embodiment, the edible ink is applied to the surface of the edible substrate so as to cover at least about 5% of the surface of the edible substrate. In another embodiment, the edible ink covers at least about 50% of the surface of the edible substrate. In yet another embodiment, the edible ink covers at least about 75% of the surface of the edible substrate. In yet a further embodiment, the edible ink may cover about 100%, or 100%, of either both surfaces.

[0330] In an additional embodiment, a method of producing a confectionery product comprises the steps of providing an edible substrate having a first and a second surface, providing a non-contact printing device having at least one printing head for printing edible ink, and printing the edible ink onto one or both surfaces. Moreover, the edible ink may be applied to one or both surfaces so as to cover at least about 5% of either or both surfaces, or from about 5% to about 100% of either or both surfaces, or any value therebetween. In another embodiment, the edible ink may cover about 50% to about 100% of either or both surfaces, or any value therebetween. In yet another embodiment, the edible ink may cover about 75% to about 100% of either or both surfaces, or any value therebetween. In yet a further embodiment, the edible ink may cover about 100%, or 100%, of either both surfaces.

[0331] Methods of producing a confectionery product may further include allowing the edible ink to absorb partially through a body of the edible substrate to provide the edible substrate with a co-extruded appearance. With co-extruded products, two or more materials are extruded through a single die with two or more orifices arranged so that the extrudates merge together into a laminar structure before cooling. With chewing gum, for example, an extruded center portion having one color

may be layered with or surrounded by an extruded outer layer or shell having a second color. A cross-sectional view of such a chewing gum product would reveal more than one color, thereby giving the gum a multi-layered or co-extruded appearance. Similarly, a cross-sectional view of the body of an edible substrate after allowing an edible ink to absorb partially through the body may reveal the color of the edible substrate on one surface of the body with the color of the edible ink on the other surface of the body that has also absorbed partially through the body. For example, the edible substrate (which may include trim material) may be light red or pink in color and a dark red edible ink may be applied to about 100%, or 100%, of one or both surfaces of the edible substrate. A cross-sectional view of this product would show a dark red exterior layer of red ink absorbed into the edible substrate and a light red layer where the edible substrate is absent of absorbed red ink. This controlled absorption of color may provide the edible substrate with a co-extruded or multi-layered look, thereby increasing consumer appeal for that product.

[0332] Referring to Figure 24, an apparatus 600 for non-stick printing ink-indicia on a confectionery product is provided. The apparatus includes a removal device 614 for removing at least a portion of the rolling compound 615 from the confectionery material 610. The removal device may be any device that removes some or all of the rolling compound 615 from the confectionery material 610. Non-limiting examples of removal devices include a vacuum system, a brush device, a sponge device, and combinations thereof. A further example of a removal device includes a washing device, a bath apparatus, and/or a rinse system that removes substantially all, or all, of the rolling compound from the confectionery material. Thus, the removing device may be a device capable of removing about 100%, or 100%, of the rolling compound 615 placed on the confectionery material 610.

[0333] In an embodiment, removal devices may be positioned above and/or below the confectionery material. Further, groups of removal devices may also be used in series or parallel configurations. Figures 24 and 25, for example, show parallel configurations of removal devices such that at least one pair of removal devices are positioned at the same point along a conveyor 618. When in parallel, the removal devices may remove rolling compound from the same portion of the confectionery

material at the same time. Therefore, a confectionery material will traverse the parallel removal devices at the same time.

[0334] By contrast, Figure 27 shows an example of a series configuration for removal devices. Here, at least two removal devices are positioned next to each other, together parallel to the direction the confectionery material moves. When in series, the removal devices do not remove rolling compound from the same portion of the confectionery material at the same time. Instead, a confectionery material that first traverses a first removal device will next traverse a second removal device.

[0335] In Figure 24, the removal device 614 is a vacuum system. The vacuum system, using suction, draws rolling compound 615 away from the confectionery material 610. In the embodiment illustrated, two vacuum systems 614 are positioned, in parallel, above and below the confectionery material 610 so as to remove rolling compound from the top and bottom portions of the confectionery material 610. Therefore, if one desires to print edible-ink-indicia on the top and/or the bottom portion of the confectionery material, one can do so. Alternatively, a single removal device or a group of devices can all be positioned above or below the confectionery material 610, as will be discussed later in reference to Figure 26. In an embodiment, the removal device may remove from about 50% to about 100% (or any value therebetween) or from about 80% to about 99% (or any value therebetween) of the rolling compound 615 from the confectionery material 610.

[0336] The apparatus also includes a printing device 601 for non-contact printing an edible ink-indicia 612 on the confectionery material 610. The printing device 601 may be any printing device as previously discussed herein. In an embodiment, the printing device 601 may be a non-contact printing device. In a further embodiment, the printing device may be an inkjet printing device. In the embodiment illustrated in Figure 24, the printing device 601 includes an ink reservoir 602 and a print jet 606 with a channel 604 operatively connecting the reservoir and jet. The print jet 606 includes a single nozzle 608, depositing a single stream of edible ink 609 onto the confectionery material 610 to produce the edible ink-indicia 612. The edible ink-indicia 612 may, for example, cover about 5 % of the confectionery product, as illustrated in Figure 24.



[0337] The apparatus of Figure 24 further includes a conveyor 618 that serves as a transport device for moving the confectionery material 610 under the printing device 601. The conveyor 618 in this embodiment is separated into smaller conveyors to allow the vacuum systems 614 access to the top and bottom portions of the confectionery material 610. Alternatively, if a single removal device or group of devices are all positioned above or below the confectionery material 610, a single long conveyor 641 with no separation may be used, as is illustrated in Figure 26.

[0338] In an embodiment, printing device 601 may include more than one ink reservoir 602, channel 604 and print jet 606. Moreover, a single reservoir 602 may be in operative communication with multiple print jets 606 and multiple ink reservoirs 602 may be in operative communication with a single print jet 606. Further, it should be understood that a single print jet may include one or more nozzles that print ink onto the confectionery material. Each of these nozzles, which originate with a single print jet, may print, for example, in unison, at different times, with different ink concentrations, with different colors, with different designs, and combinations thereof.

[0339] In another embodiment, illustrated on Figure 25, an apparatus 620 is provided that includes a pair of brush devices 622 positioned above and below the confectionery material 628 at a separation in the conveyor 618. These brush devices 622, similar to the vacuum systems 614 of Figure 24 are positioned so as to remove rolling compound 615 from the confectionery material. The embodiment in Figure 25 also provides a single print jet with multiple nozzles 624a, 624b and 624c. Each nozzle deposits a respective edible ink stream 626a, 626b and 626c. The use of multiple nozzles for a single print jet allows, for example, increased flexibility in the indicia printed. For example, if the nozzles do not print in unison, the indicia can have alternating sections of non-printed confectionery material between printed indicia. The edible ink-indicia 630 of Figure 25 illustrates an example of such flexibility. The edible ink-indicia 630 of Figure 25 also provides an example of ink indicia covering about 50% of the confectionery product.

[0340] In another embodiment, illustrated on Figure 26, an apparatus 632 is provided that includes a first detection device 634 positioned upstream of the printing device 601 and a second detection device 638 positioned downstream of the printing device 601. The first detection device 634 may be, for example, a photoeye that

detects the confectionery material 610 when the confectionery material is in a predetermined position. The detection device 634 may be in operative communication with the printing device 601 such that the printing device 601 non-contact prints an edible ink-indicia 612 on the confectionery material when the detection device 634 detects the confectionery material in a predetermined position. For example, the apparatus may have a controller that initiates the printing device when confectionery material is in the predetermined position. At that point, the printing device can, for example, print edible ink indicia at the predetermined position and/or continue to print the edible ink indicia as the confectionery material traverses the printing device. When continuing to print, the printed edible ink indicia may cover about 75% of the confectionery product as illustrated, for example, on Figure 26.

[0341] The second detection device 638 may also be, for example, a photoeye that detects defective confectionery material after the confectionery has been printed upon. The detection device 638 may also be in operative communication with the printing device 601 such that the printing device 601 will turn off when the second detection device 638 detects defective confectionery material. Such operative communication, similar to the first detection device 634, may be accomplished with a controller that turns off the printing device 601 when detection device 638 detects defective product and sends the appropriate signal to the controller.

[0342] The detection device may be any detection device as is commonly known in the art. Also, any manner of detection known by one skilled in the art may be used in the present disclosure. Nonlimiting examples of suitable detection devices include, for example, infrared sensors, camera/photo monitoring, luminescence sensors, light array sensors, color sensors, mark sensors, profiling sensors and combinations thereof. Further, at least one detection device may be used. Therefore, if positioned correctly, a single detection device may be used for both operation of the printing device and for detection of defective confectionery material. For example, if a small indicia is printed on the confectionery material, a single detection device located slightly downstream from the printing device can both detect defective confectionery material and also detect confectionery material in a predetermined position for non-contact printing.

[0343] In another embodiment, illustrated on Figure 27, an apparatus 642 is provided that includes multiple removal devices, a vacuum system 648 and a brush device 652, operating in series to remove rolling compound 615 from confectionery material 644. In this embodiment, vacuum system 648 performs two functions. First, vacuum system 648 draws removed rolling compound away from the confectionery material 644. Second, vacuum system 648 draws away rolling compound removed by the brush device 652 such that the rolling compound drawn 650 removed includes rolling compound removed from both the vacuum system and the brush device. Figure 27 also illustrates edible ink indicia 646 that covers about 100%, or 100%, of the confectionery product. Figure 21 also provides another example of similar coverage by edible ink indicia.

[0344] Alternatively, multiple removal devices can be used in series while being kept apart from each other. For example, a series configuration of a brush device and vacuum system can be used such that the brush device accomplishes a portion of the required removal percentage and the vacuum system accomplishes the remaining portion of the required removal percentage. For instance, if required to remove about 80% of the rolling compound, the brush device can remove about 40% and the vacuum system can remove about 40%. This configuration may be beneficial because it may allow the vacuum system to operate at a lower power level. By operating at a lower power level, there is a decreased risk that suction from the vacuum system can, for example, lift the confectionery material off the conveyor, stretch the confectionery material or crack the confectionery material.

[0345] Figure 27 also illustrates edible ink indicia 646 that covers about 100%, or 100%, of the confectionery product. Figure 21 also provides another example of similar coverage by edible ink indicia.

[0346] It should be understood that various changes and modifications to the presently preferred embodiments described herein will be apparent to those skilled in the art. Such changes and modifications can be made without departing from the spirit and scope of the present subject matter and without diminishing its intended advantages. It is therefore intended that such changes and modifications be covered by the appended claims.

## CLAIMS

1. An apparatus for producing a product comprising:  
an extruder for extruding a slab of an edible substrate; and  
a non-contact printing device for printing an edible ink on the slab.
2. The apparatus of claim 1 further comprising a component selected from the group consisting of a dusting device, a sizing roller, a cutting device, a cooling device, a curing chamber, a coating device, a packaging device, and combinations thereof.
3. The apparatus of claim 1 wherein the printing device is located at a position downstream of the extruder and upstream of a dusting device.
4. The apparatus of claim 1 wherein the printing device is located at a position downstream of a dusting device and upstream of a sizing roller.
5. The apparatus of claim 1 wherein the printing device is located at a position downstream of a sizing roller and upstream of a cutting device.
6. The apparatus of claim 1 wherein the printing device is located at a position downstream of a cutting device and upstream of a cooling device.
7. The apparatus of claim 1 wherein the printing device is located at a position downstream of a cooling device and upstream of a curing chamber.
8. The apparatus of claim 1 wherein the printing device is located at a position downstream from a coating device.
9. The apparatus of claim 1 further comprising a first printing device located on a first side of the slab and a second printing device located on a second side of the slab, the first and second printing devices printing the edible ink on opposing sides of the slab.

10. The apparatus of claim 1 wherein the printing device prints an edible ink-indicia on the slab.

11. The apparatus of claim 1 wherein the printing device is an ink jet printing device.

12. The apparatus of claim 1 wherein the edible ink is selected from the group consisting of an absorbing ink, a solvent-based ink, a wax-based ink, and combinations thereof.

13. The apparatus of claim 1 wherein the edible ink is printed at select locations along the slab.

14. The apparatus of claim 1 wherein the edible ink further comprises an organoleptic component.

15. The apparatus of claim 1 comprising a cutting device for cutting the slab into individual pieces, the printing device printing the edible ink on the individual pieces.

16. A method for producing comestible product comprising:  
extruding a slab of an edible substrate; and  
printing an edible ink onto the slab using a printing device without contacting a surface of the slab with the printing device.

17. The method of claim 16 comprising dispensing an organoleptic component onto the slab.

18. The method of claim 16 comprising cutting the slab into individual confectionery pieces and printing the edible ink on the individual pieces.

19. The method of claim 18 comprising coating the individual confectionery pieces before the printing.

20. The method of claim 16 wherein the slab has opposing first and second sides, the method comprising printing the edible ink on the first side and on the second side.

21. The method of claim 16 comprising inkjet printing the edible ink on the slab.
22. The method of claim 16 comprising moving the slab during the printing.
23. A method for producing a comestible product comprising:  
extruding a rope of a center-filled confectionery material; and  
printing an edible ink on the rope.
24. The method of claim 23 wherein the printing comprises non-contact printing.
25. The method of claim 23 comprising forming the rope into individual pieces of center-filled confectionery material and printing the edible ink on the individual pieces.
26. The method of claim 23 comprising placing the individual pieces of the center-filled confectionery material into a package, the edible ink being visible through the package.
27. A method for producing a chewing gum product comprising:  
non-contact printing an edible ink on a slab of chewing gum.
28. The method of claim 27 comprising cutting the slab of chewing gum and individual pieces, the non-contact printing occurring before the cutting.
29. An edible product comprising:  
an edible substrate;  
an edible ink-indicia printed on the edible substrate; and  
an organoleptic component corresponding to a feature of the edible ink-indicia.
30. The product of claim 29 wherein the edible substrate is selected from the group consisting of a confectionery, a coated confectionery, a chewing gum, a

coated chewing gum, a center-filled chewing gum, a coated center-filled chewing gum, and combinations thereof.

31. The product of claim 29 wherein the edible ink-indicia is selected from the group consisting of a word, an image, a color, a symbol, an object, an alphanumeric representation, a letter, text, a shape, a fanciful shape, a symbol, a logo, a graphic, an advertising indicia, and combinations thereof.

32. The product of claim 29 wherein the organoleptic component is selected from the group consisting of a flavoring agent, a cooling agent, a heating agent, a mouthfeel agent, a tingling agent, a fizzing agent, a sweetening agent, a souring agent, a bittering agent, a teeth whitening agent, a breath freshening agent, an anti-cavity agent, an audible agent, and combinations thereof.

33. The product of claim 29 wherein the feature is selected from the group consisting an element of the ink-indicia, a color of the ink-indicia, a meaning conveyed by the ink-indicia, a perception generated by the ink-indicia, a concept communicated by the ink-indicia, and combinations thereof.

34. The product of claim 29 wherein the edible ink-indicia is a high-resolution image.

35. The product of claim 29 wherein the edible ink-indicia comprises a word and the feature is a meaning of the word.

36. The product of claim 29 wherein the edible ink-indicia is an inkjet-indicia.

37. The product of claim 29 comprising a multicolor edible ink-indicia.

38. The product of claim 29 comprising a plurality of organoleptic components.

39. An edible product comprising:  
an edible substrate;  
an edible ink-indicia printed on the edible substrate; and  
an organoleptic component corresponding to a feature of the edible substrate.

40. The edible substrate of claim 39 wherein the feature is selected from the group consisting of a structure of the edible substrate, a composition of the edible substrate, an ingredient in the edible substrate, a surface texture of the edible substrate, a hardness of the edible substrate, and combinations thereof.

41. The product of claim 39 wherein the edible substrate is a chewing gum and the feature is a center-fill portion of the chewing gum.

42. An edible product comprising:  
an edible substrate having opposing first and second sides;  
a first edible ink-indicia on the first side;  
a second edible ink-indicia on the second side, and wherein a portion of the first edible ink-indicia contacts a portion of the second edible ink-indicia.

43. The edible product of claim 42 wherein the first edible ink-indicia contacts the second edible indicia at an edge of the edible substrate.

44. The edible product of claim 42 wherein the first and second edible ink-indicia are inkjet indicia.

45. The edible product of claim 42 comprising an organoleptic component on the edible substrate.

46. The edible product of claim 42 wherein the first and second edible ink-indicia cover substantially an entire outer surface of the edible substrate.



47. A method for producing an edible product comprising:  
non-contact printing an edible ink-indicia on an edible substrate; and  
placing on the edible substrate an organoleptic component that corresponds to a feature of the edible ink-indicia.

48. The method of claim 47 comprising non-contact printing a word on the edible substrate and the organoleptic component corresponds to a meaning of the word.

49. The method of claim 47 comprising non-contact printing a high-resolution image on the edible substrate.

50. A method for producing an edible product comprising:  
non-contact printing an edible ink-indicia on an edible substrate; and  
dispensing on the edible substrate an organoleptic component that corresponds to a feature of the edible substrate.

51. The method of claim 50 comprising forming a surface texture on the edible substrate, the organoleptic component corresponding to the surface texture.

52. A method of preparing an edible product comprising:  
non-contact printing an edible ink-indicia on an edible substrate; and  
dispensing a precision dose of an organoleptic component on the edible substrate.

53. The method of claim 52 wherein the dispensing further comprises ink jet printing.

54. The method of claim 52 further comprising weighing the edible substrate to determine the precision dose.

55. A wrapped edible product comprising:  
an edible substrate having an edible advertising indicia disposed on a surface thereof; and

a transparent wrapper surrounding the edible substrate, at least a portion of the edible advertising indicia visible through the wrapper.

56. The wrapped edible product of claim 55 wherein the edible advertising indicia is a high resolution image.

57. The wrapped edible product of claim 55 wherein the edible advertising indicia is an inkjet-indicia.

58. The wrapped edible product of claim 55 wherein the edible advertising indicia is substantially coextensive with an entire surface area of the edible substrate.

59. The wrapped edible product of claim 55 wherein the edible substrate has opposing first and second surfaces, and the advertising indicia is located on the first and second surfaces.

60. The wrapped edible product of claim 55 comprising an organoleptic component disposed on the edible substrate surface.

61. The wrapped edible product of claim 60 wherein the organoleptic component corresponds to a feature of the advertising indicia.

62. A wrapped edible product comprising:  
an edible substrate having an edible ink-indicia disposed on a surface thereof;  
and

a wrapper surrounding the edible substrate and having a wrapper indicia on an exposed surface, the wrapper indicia matching the edible ink-indicia.

63. The wrapped edible product of claim 62 wherein the wrapper indicia is identical to the edible ink-indicia

64. A method for producing an edible product comprising:  
printing an edible advertising indicia on a surface of an edible substrate; and  
wrapping the edible substrate in a transparent wrapper, the edible advertising indicia visible through the wrapper.

65. The method of claim 64 comprising non-contact printing.

66. The method of claim 64 wherein the surface has a surface area, the method comprising printing the edible advertising indicia on substantially the entire surface area.

67. The method of claim 64 comprising high resolution printing the edible advertising indicia on the surface.

68. The method of claim 64 comprising printing the edible advertising indicia on a first surface and on an opposing second surface of the edible substrate.

69. A method of selling an edible product comprising:  
distributing, to a consumer, an event product comprising an edible ink-indicia corresponding to an event on an edible substrate.

70. The method of claim 69 wherein the event is selected from the group consisting of a current event, a sports event, a holiday, a religious event, a political event, a seasonal event, a cultural event, a personal event, and combinations thereof.

71. The method of claim 69 wherein the distributing occurs at a time period selected from the group consisting of before the event, during the event, after the event, and combinations thereof.

72. The method of claim 69 wherein the distributing occurs at the event.
73. The method of claim 69 wherein the distributing occurs within about 24 hours after the event.
74. The method of claim 69 comprising awaiting a result of the event and printing the result on the event product.
75. The method of claim 74 comprising printing the result within about 1 second to about 24 hours after the occurrence of the result.
76. The method of claim 74 comprising distributing the event product within about 1 minute to about 24 hours after the occurrence of the result.
77. The method of claim 69 comprising dispensing an organoleptic component on the edible substrate.
78. A method of advertising comprising:  
distributing, to a consumer, an event product advertisement comprising i) an edible ink-indicia corresponding to an event and ii) an edible advertising indicia on an edible substrate.
79. An apparatus for producing an edible product comprising:  
a dispensing device for spraying a molten gum base composition onto an edible substrate.
80. The apparatus of claim 79 wherein the dispensing device is selected from the group consisting of an inkjet printing device and a valve-jet spraying device.
81. The apparatus of claim 79 comprising a transport device for moving the edible substrate proximate to the dispensing device.

82. The apparatus of claim 79 comprising a controller in operative communication with the dispensing device for controlling a spray of the molten gum base composition.

83. The apparatus of claim 79 further comprising a printing device for printing an edible ink-indicia on a material selected from the group consisting of the edible substrate, the molten gum base composition, and combinations thereof.

84. A confectionery product comprising:  
an edible substrate; and  
a melted gum base composition adhered to the edible substrate.

85. The confectionery product of claim 84 wherein the edible substrate is selected from the group consisting of a confectionery, a coated confectionery, a chewing gum, a coated chewing gum, a center-filled chewing gum, a coated center-filled chewing gum, and combinations thereof.

86. The confectionery product of claim 84 wherein the melted gum base composition is selected from the group consisting of an elastomer, a resin, a softener, a wax, and combinations thereof.

87. The confectionery product of claim 84 wherein the melted gum base composition comprises an organoleptic component.

88. The confectionery product of claim 84 comprising an edible ink-indicia located on a material selected from the group consisting of the melted gum base composition, the edible substrate, and combinations thereof.

89. The confectionery product of claim 84 comprising an inkjet edible ink-indicia.

90. The confectionery product of claim 84 comprising a first melted gum base composition on a first portion of the edible substrate and a second melted gum base composition on a second portion of the edible substrate, the first melted gum base composition being different than the second melted gum base composition.

91. The confectionery product of claim 84 wherein the melted gum base composition forms an object on a surface of the edible substrate.

92. The confectionery product of claim 84 wherein the melted gum base composition forms a three-dimensional object on a surface of the edible substrate.

93. A confectionery product comprising:  
a first layer of an edible substrate; and  
a second layer of a melted gum base composition adhered to the first layer.

94. The confectionery product of claim 93 wherein the first and second layers are substantially coextensive.

95. The confectionery product of claim 93 comprising a third layer of a melted gum base composition, the third layer adhered to a surface selected from the group consisting of a surface of the second layer and a surface of the edible substrate.

96. The confectionery product of claim 93 wherein the second layer comprises from about 30% to about 100% by weight of the melted gum base composition and from about 0% to about 70% by weight of an organoleptic component.

97. A method for producing a confectionery product comprising:  
spraying particles of a molten gum base composition onto a surface of an edible substrate; and  
forming a multiple phase confectionery product.

98. The method of claim 97 comprising forming a layer of the molten gum base composition on the surface.

99. The method of claim 98 comprising forming a second layer of the molten gum base composition on the layer.

100. The method of claim 97 comprising forming, with molten gum base composition, an object on the surface.

101. The method of claim 97 comprising forming, with the molten gum base composition, a three-dimensional object on the surface.

102. The method of claim 97 comprising changing an ingredient of the molten gum base composition during the spraying.

103. The method of claim 97 comprising dispensing an organoleptic component on the edible substrate.

104. The method of claim 103 comprising changing, during the spraying, a component of the organoleptic component.

105. The method of claim 97 comprising spraying a first molten gum base composition on a first portion of the edible substrate and spraying a second molten gum base composition different than the first molten gum base composition on a second portion of the edible substrate.

106. The method of claim 97 comprising dispensing an organoleptic component on a material selected from the group consisting of the molten chewing gum base composition, the edible substrate, and combinations thereof.

107. The method of claim 97 comprising printing an edible ink-indicia on a material selected from the group consisting of the molten gum base composition, the edible substrate, and combinations thereof.

108. A method for producing a chewing gum product comprising:  
providing a chewing gum substrate having a thickness less than a predetermined thickness;

spraying a layer of a molten chewing gum base composition on the chewing gum substrate to form a chewing gum product having the predetermined thickness.

109. The method of claim 108 comprising repeating the spraying to obtain the predetermined thickness.

110. The method of claim 108 wherein the predetermined thickness is selected from the group consisting of the thickness of a chewing gum stick, the thickness of a chewing gum tab, and the thickness of a chewing gum pellet.

111. A confectionery product comprising:  
an edible substrate having a surface; and  
an edible ink printed on the edible substrate, the edible ink covers at least about 5% of the surface.

112. The confectionery product of claim 111 wherein the edible substrate is a chewing gum selected from the group consisting of a chewing gum stick, a chewing gum tablet, a chewing gum pellet, a coated chewing gum, a center-filled chewing gum and combinations thereof.

113. The confectionery product of claim 111 wherein the edible ink covers at least about 50% of the surface.

114. The confectionery product of claim 111 wherein the edible ink covers at least about 75% of the surface.



115. The confectionery product of claim 111 wherein the edible ink covers about 100% of the surface.

116. The confectionery product of claim 111 wherein the edible substrate has a first surface and an opposing second surface and the edible ink is printed on only the first surface.

117. The confectionery product of claim 111 wherein the edible substrate has a first surface and an opposing second surface and the edible ink is printed on each of the first and the second surfaces.

118. The confectionery product of claim 117 wherein the edible ink covers at least about 5% of each of the first and the second surfaces.

119. The confectionery product of claim 117 wherein the edible ink covers at least about 50% of the first and the second surfaces.

120. The confectionery product of claim 117 wherein the edible ink covers at least about 75% of the first and the second surfaces.

121. The confectionery product of claim 111 wherein the edible ink is multicolored.

122. The confectionery product of claim 111 wherein only a single color of edible ink is present on any portion of the surface.

123. The confectionery product of claim 111 wherein the edible substrate comprises a trim material.

124. The confectionery product of claim 111 wherein the edible ink is an inkjet ink.

125. The confectionery product of claim 111 wherein the edible ink is printed on the edible substrate at a concentration from about 3600 dots per square inch to about 36,400 dots per square inch.

126. A confectionery product comprising:

an edible substrate having a body and first and second surfaces that are located on opposite sides of the edible substrate; and

an edible ink printed on the edible substrate, the edible ink covers at least about 5% of the first surface of the edible substrate and does not extend through the body, and therefore is not visible on the second surface of the edible substrate.

127. The confectionery product of claim 126 wherein the edible substrate is a chewing gum selected from the group consisting of a chewing gum stick, a chewing gum tablet, a chewing gum pellet, a coated chewing gum, a center-filled chewing gum and combinations thereof.

128. The confectionery product of claim 126 wherein the edible ink covers at least about 50% of the first surface and does not extend through the body, and therefore is not visible on the second surface.

129. The confectionery product of claim 126 wherein the edible ink covers at least about 75% of the first surface and does not extend through the body, and therefore is not visible on the second surface.

130. The confectionery product of claim 126 wherein the edible ink covers about 100% of the first surface and does not extend through the body, and therefore is not visible on the second surface.

131. The confectionery product of claim 126 wherein the edible ink is printed on the second surface.

132. The confectionery product of claim 126 wherein the edible substrate comprises a trim material.

133. The confectionery product of claim 126 wherein the confectionery product has the appearance of a co-extruded product.

134. A method of producing a confectionery product comprising:  
non-contact printing an edible ink onto a surface of an edible substrate to cover at least about 5% of the surface.

135. The method of claim 134 comprising non-contact printing a multiple color edible ink.

136. The confectionery product of claim 134 comprising covering at least about 50% of the surface with the edible ink.

137. The confectionery product of claim 134 comprising covering at least about 75% of the surface with the edible ink.

138. The method of claim 134 comprising applying the edible ink at a dot concentration from about 3600 dots per square inch to about 36,400 dots per square inch.

139. The method of claim 134 wherein the edible substrate traverses a printing device at least once during printing.

140. The method of claim 134 comprising allowing the edible ink to absorb partially through a body of the edible substrate to provide the edible substrate with a co-extruded appearance.

141. The method of claim 134 wherein the edible ink is an inkjet ink.

142. An apparatus comprising:

a removal device for removing at least a portion of a rolling compound from a confectionery material; and

a printing device for non-contact printing an edible ink-indicia on the confectionery material.

143. The apparatus of claim 142, comprising a transport device for moving the confectionery material under the printing device.

144. The apparatus of claim 142, wherein the removal device is selected from the group consisting of a vacuum system, a brush device, a sponge device, and combinations thereof.

145. The apparatus of claim 142, comprising a detection device in operative communication with the printing device, the printing device non-contact printing the edible ink-indicia on the confectionery material after the detection device detects the confectionery material at a predetermined position.

146. The apparatus of claim 145, wherein the detection device comprises at least one photoeye.

147. The apparatus of claim 142, wherein the confectionery material is a chewing gum selected from the group consisting of a chewing gum stick, a chewing gum tablet, a chewing gum pellet, a coated chewing gum, a center-filled chewing gum, and combinations thereof.

148. The apparatus of claim 142 wherein the printing device is a spray device.

149. An apparatus comprising:

a transport device for moving a confectionery material to a predetermined position;

a detection device detecting the presence of the confectionery material at the predetermined position; and

a printing device in operative communication with the detection device, the printing device non-contact printing an edible ink-indicia on the confectionery material after the detection device detects the confectionery material at the predetermined position.

150. The apparatus of claim 149, comprising a removal device for removing of a portion of a rolling compound from the confectionery material.

151. The apparatus of claim 150, wherein the removal device is selected from the group consisting of a vacuum system, a brush device, a sponge device, and combinations thereof.

152. The apparatus of claim 149, wherein the detection device comprises at least one photoeye.

153. The apparatus of claim 149, wherein the confectionery material is a chewing gum selected from the group consisting of a chewing gum stick, a chewing gum tablet, a chewing gum pellet, a coated chewing gum, a center-filled chewing gum, and combinations thereof.

154. A method for producing a confectionery product comprising:  
removing a rolling compound from a confectionery material; and  
non-contact printing an edible ink-indicia on the confectionery material.

155. The method of claim 154, comprising removing from about 80% to about 99% of the rolling compound from the confectionery material.

156. The method of claim 154, wherein the removing is an act selected from the group consisting of vacuuming the rolling compound, brushing the rolling compound, sponging the rolling compound, and combinations thereof.

157. The method of claim 154, comprising moving a confectionery material to a predetermined position for non-contact printing the edible ink-indicia on the confectionery material.

158. The method of claim 154, further comprising detecting the presence of the confectionery material at a predetermined position before the non-contact printing.

159. The method of claim 154, wherein the confectionery material is a chewing gum selected from the group consisting of a chewing gum stick, a chewing gum tablet, a chewing gum pellet, a coated chewing gum, a center-filled chewing gum, and combinations thereof.

160. A method for producing a confectionery product comprising:  
moving a confectionery material to a predetermined position;  
detecting the presence of the confectionery material at the predetermined position; and  
non-contact printing an edible ink-indicia on the confectionery material.

161. The method of claim 160, comprising removing a rolling compound from the confectionery material before the non-contact printing.

162. The method of claim 161, comprising removing from about 80% to about 99% of the rolling compound from the confectionery material.

163. The method of claim 161, wherein the removing is an act selected from the group consisting of vacuuming the rolling compound, brushing the rolling compound, sponging the rolling compound, and combinations thereof.

164. A method for producing a chewing gum product comprising:  
providing a consumer with the ability to select an organoleptic component;

producing a chewing gum product with the organoleptic component after the consumer selection; and  
delivering the chewing gum product to the consumer.

165. The method of claim 164 wherein the providing comprises providing an Internet site with a list of organoleptic components.

166. The method of claim 164 wherein the producing comprises dispensing the organoleptic component on a surface of the chewing gum product.

167. The method of claim 164 wherein the delivering comprises mailing the chewing gum product to the consumer.

168. The method of claim 164 comprising providing the consumer the ability select to an indicia; and producing the chewing gum product with the indicia.

169. The method of claim 168 comprising printing an edible ink on a surface of the chewing gum product to form the indicia.

170. The method of claim 164 comprising:  
generating a list of organoleptic components in a computer-readable medium;  
receiving data that selects at least one of the organoleptic components;  
generating instruction data from the received data; and  
transmitting the instruction data to a dispensing device, the dispensing device dispensing the at least one organoleptic component onto a surface of an edible substrate based on the instruction data.

171. The method of claim 170 wherein the received data further comprises indicia data, and the instruction data further comprises indicia data printing instructions, the method comprising transmitting the indicia data printing instructions to a printing device, the printing device printing an edible ink-indicia on the surface of the edible substrate based on the indicia data printing instructions.

172. A method of generating revenue comprising:  
allowing a consumer to create a custom chewing gum by selecting an organoleptic component; and  
producing a chewing gum product with the selected organoleptic component.

173. The method of claim 172 comprising allowing the consumer to select an indicia and producing the chewing gum product with the indicia.



Fig. 1

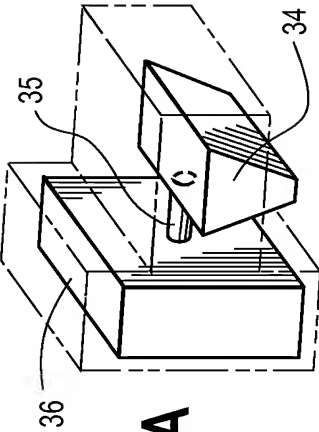
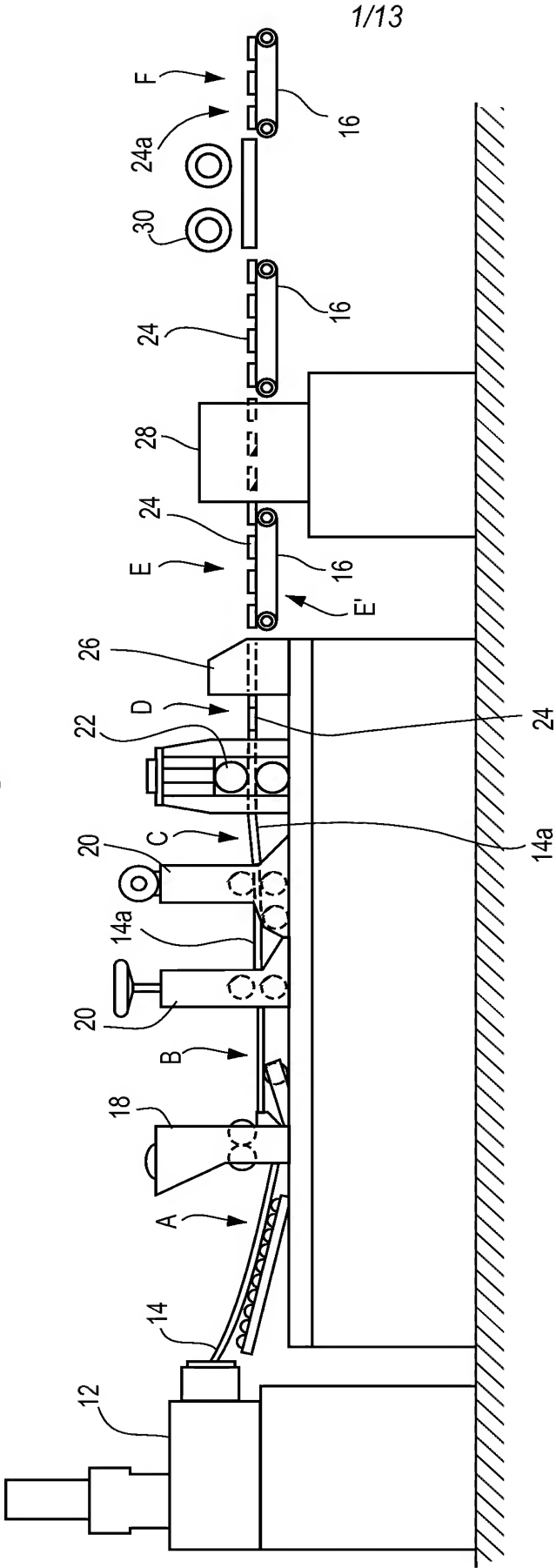
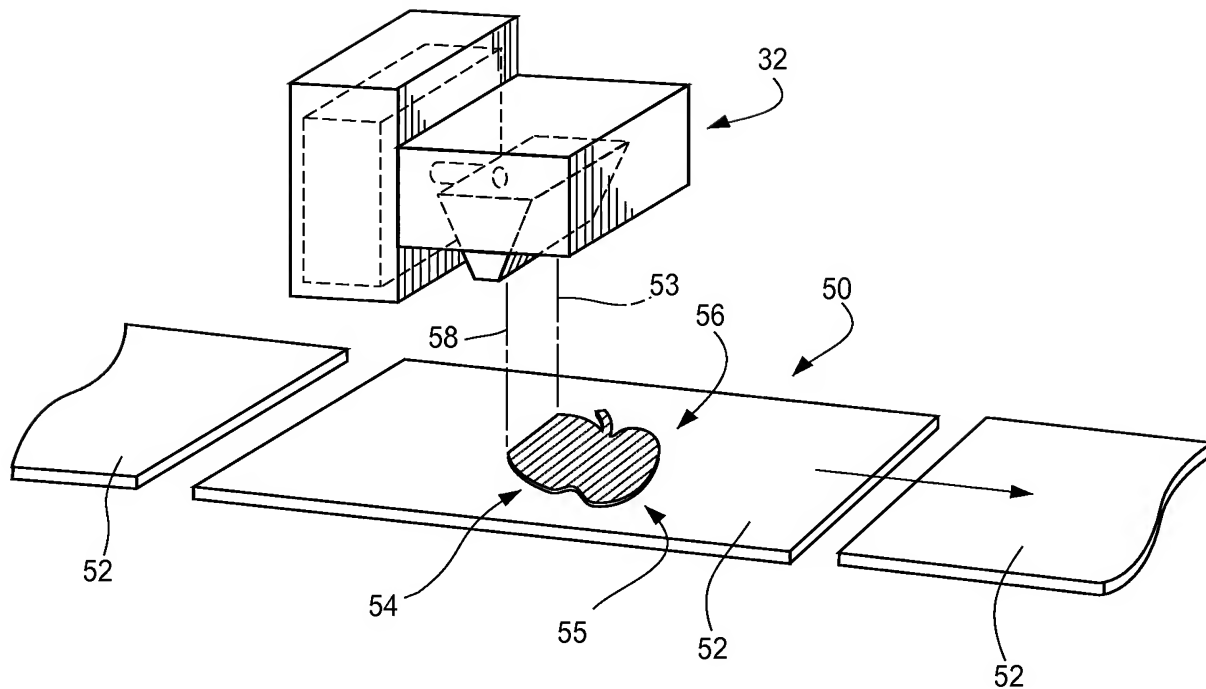


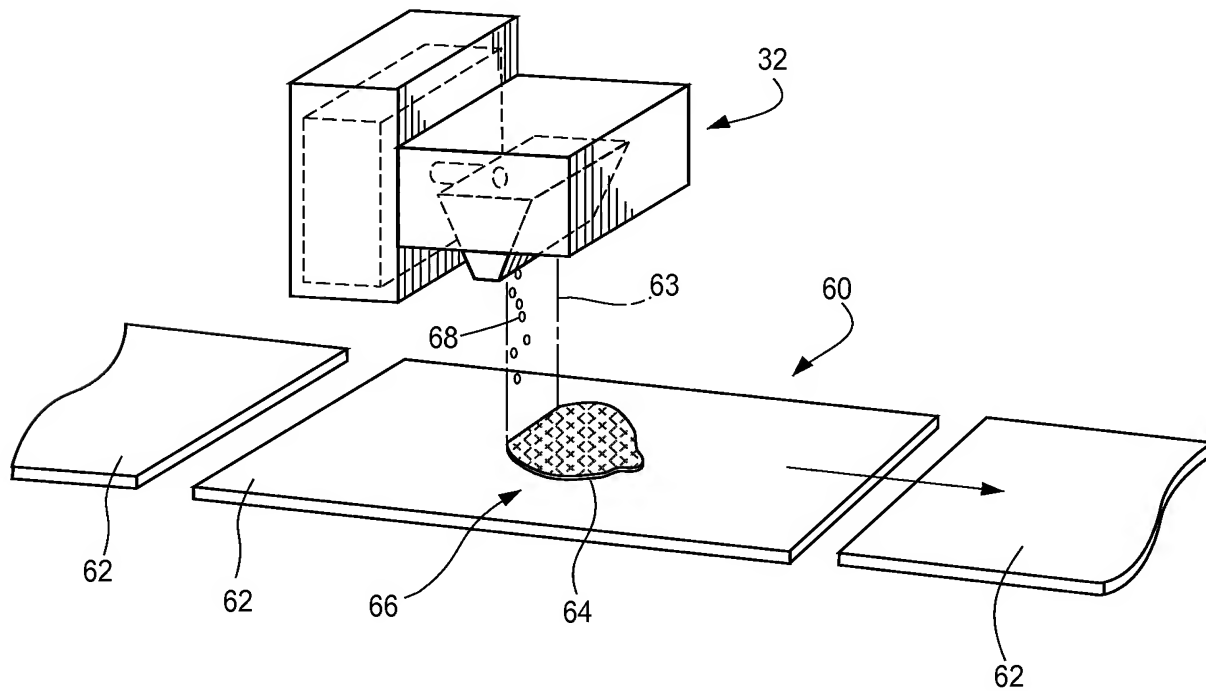
Fig. 1A

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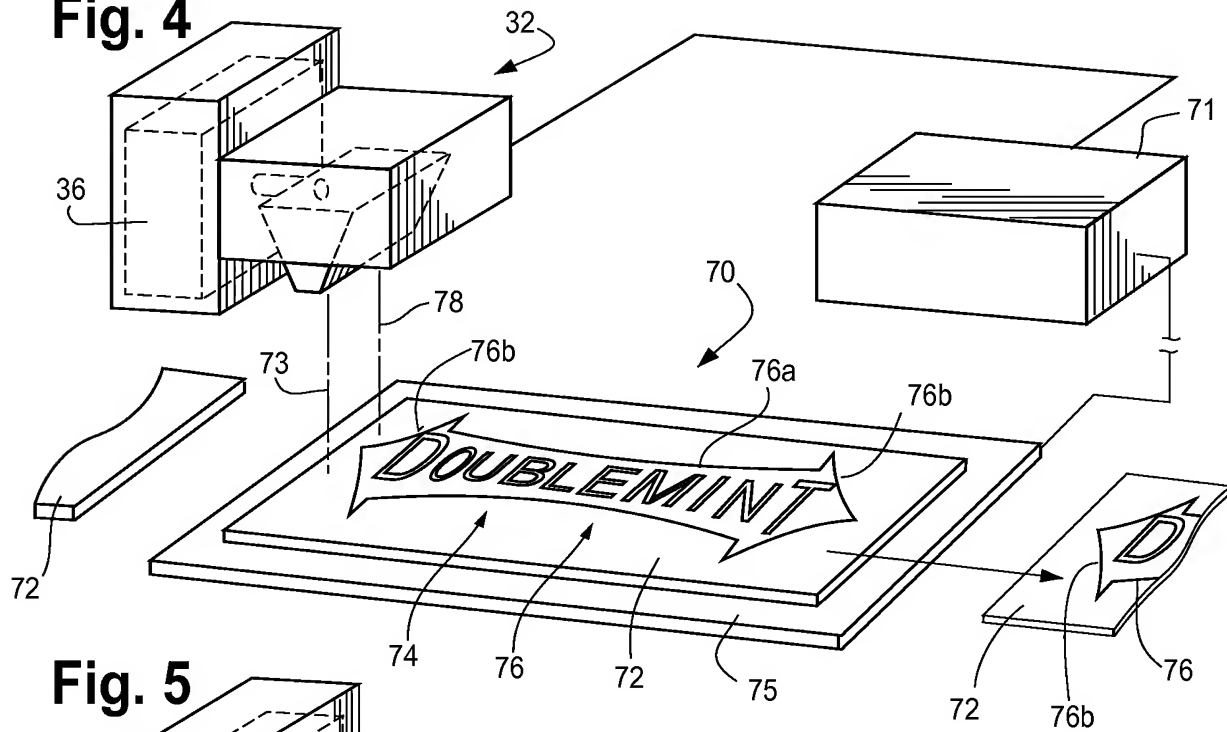
**Fig. 2**



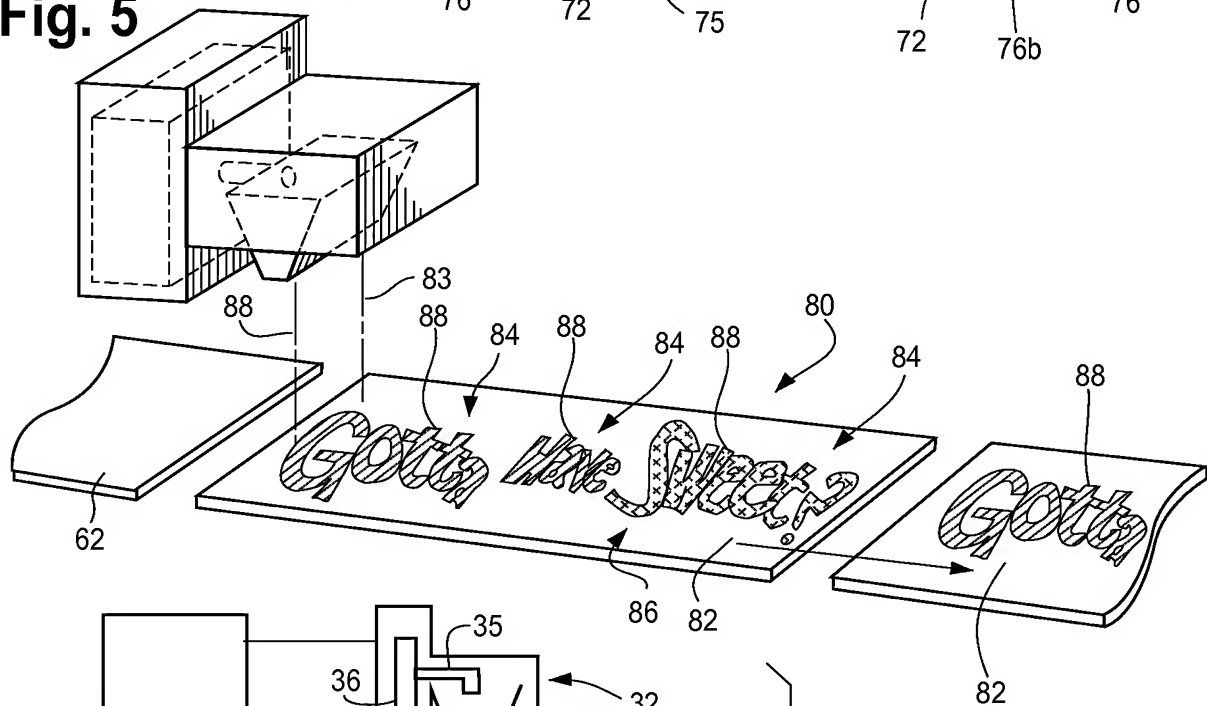
**Fig. 3**



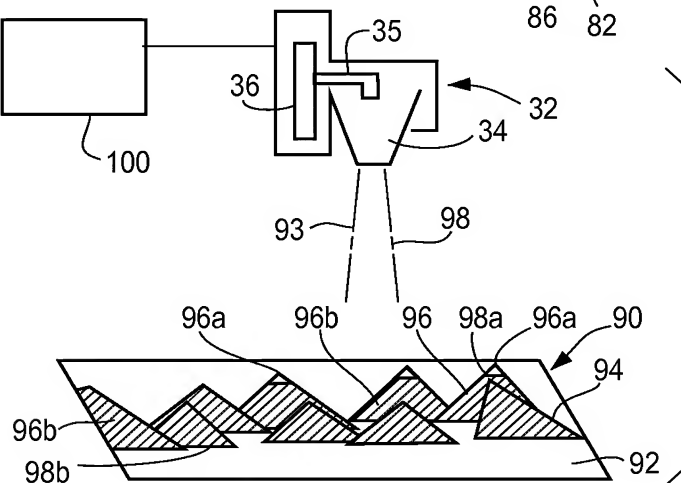
**Fig. 4**



**Fig. 5**

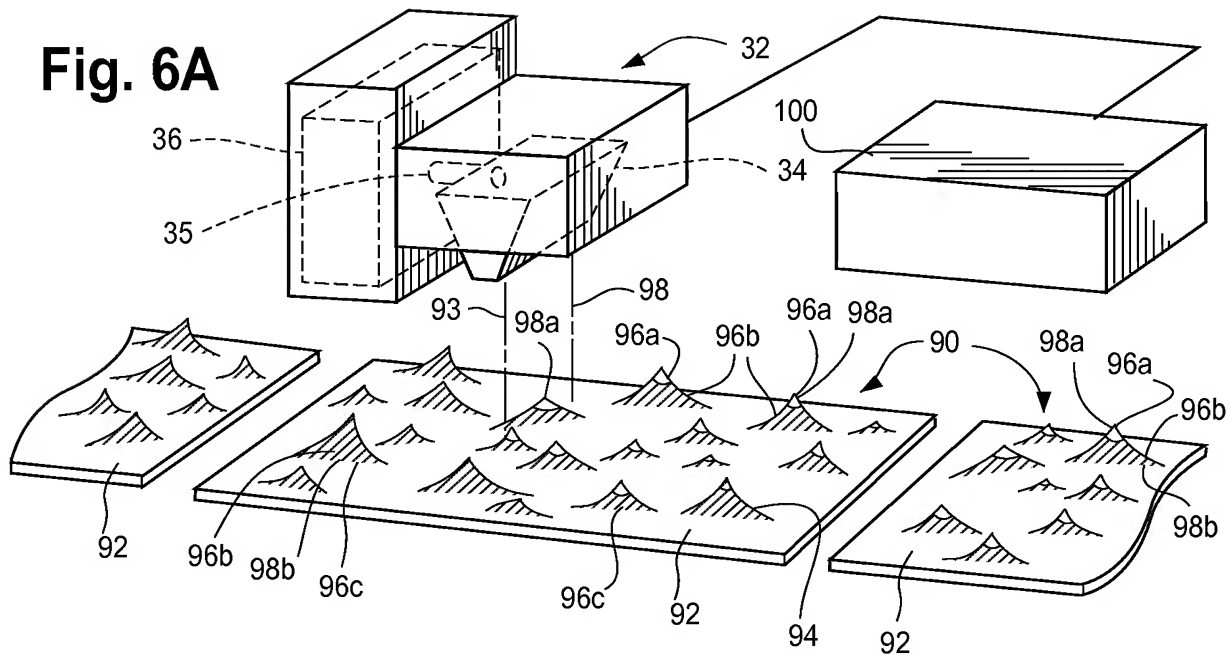


► **Fig. 6**

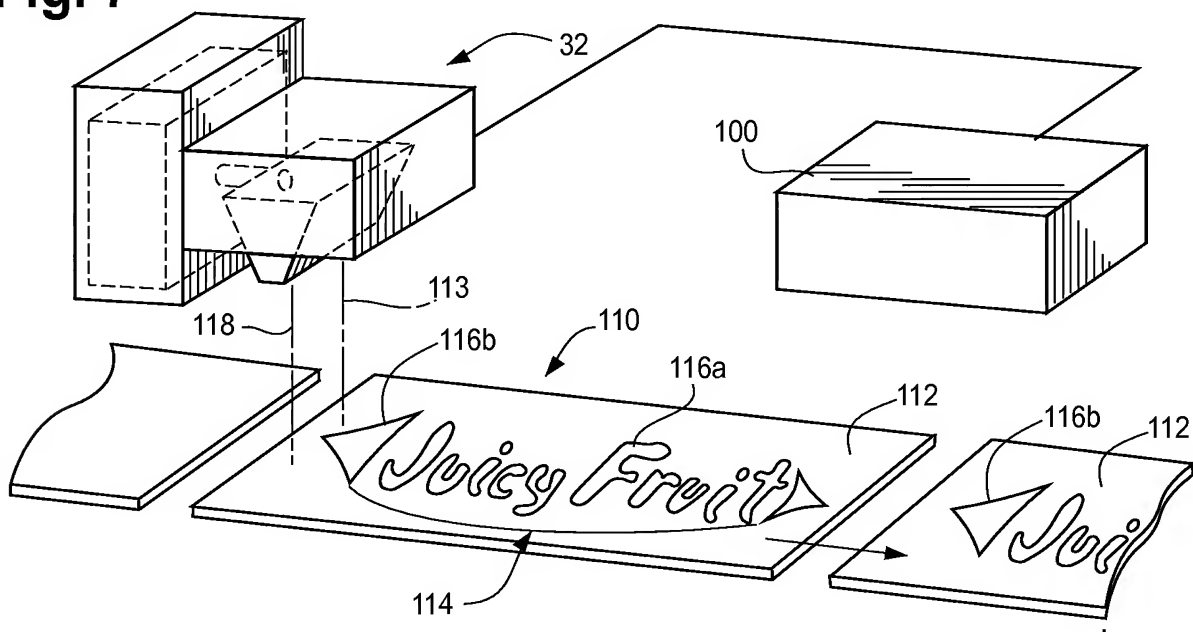


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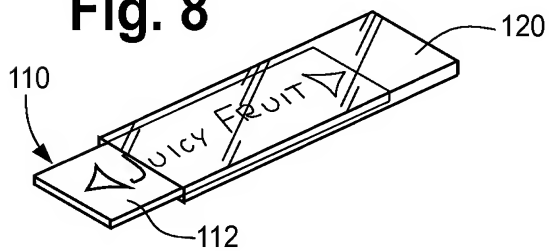
**Fig. 6A**



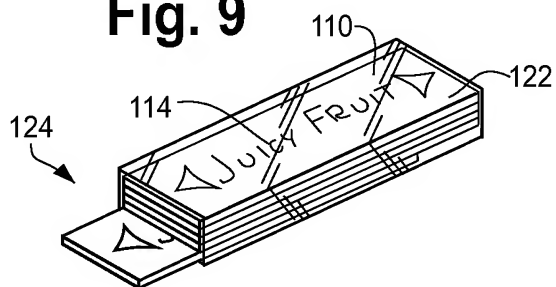
**Fig. 7**



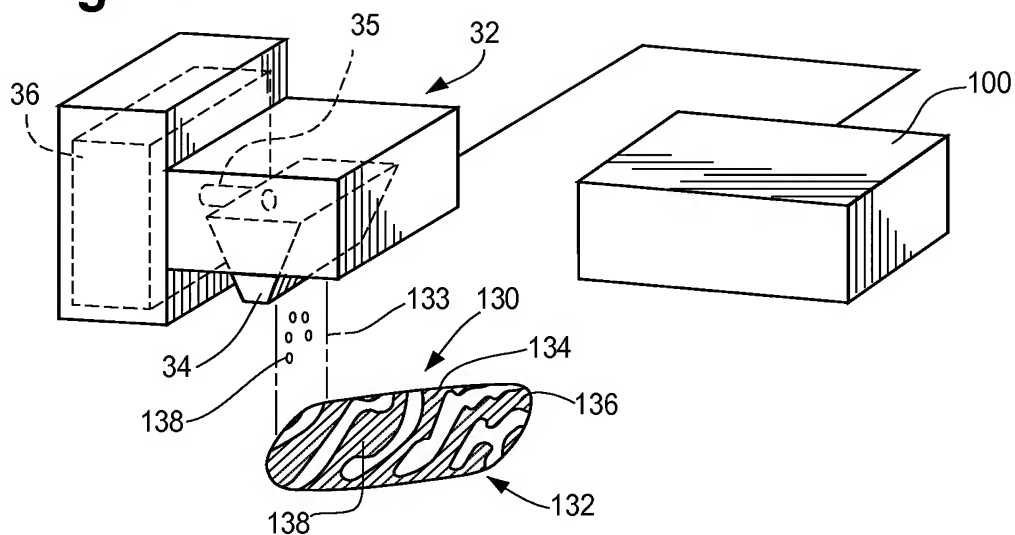
**Fig. 8**



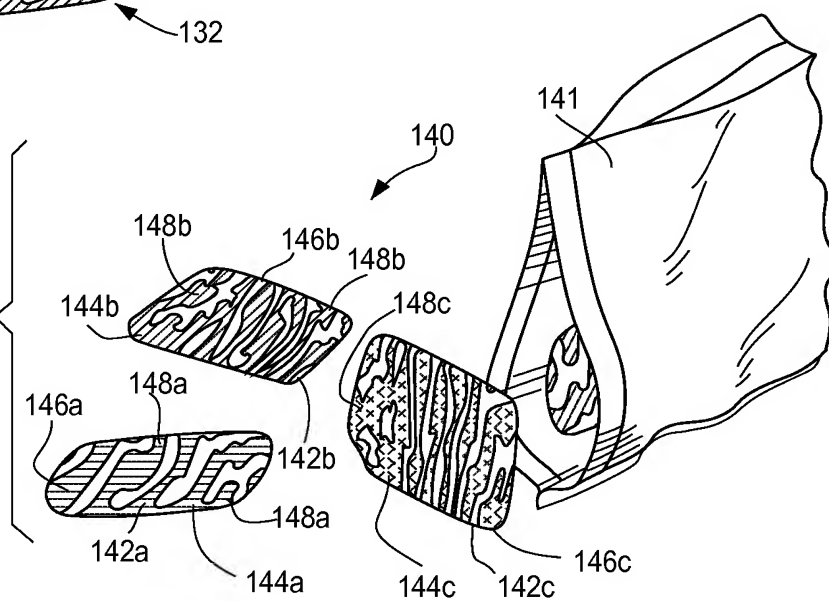
**Fig. 9**



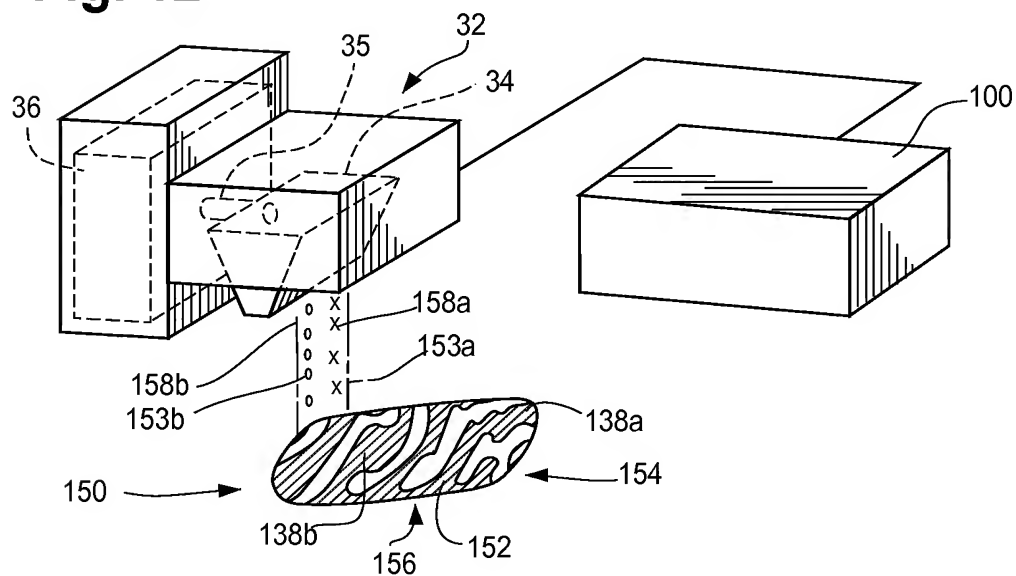
**Fig. 10**

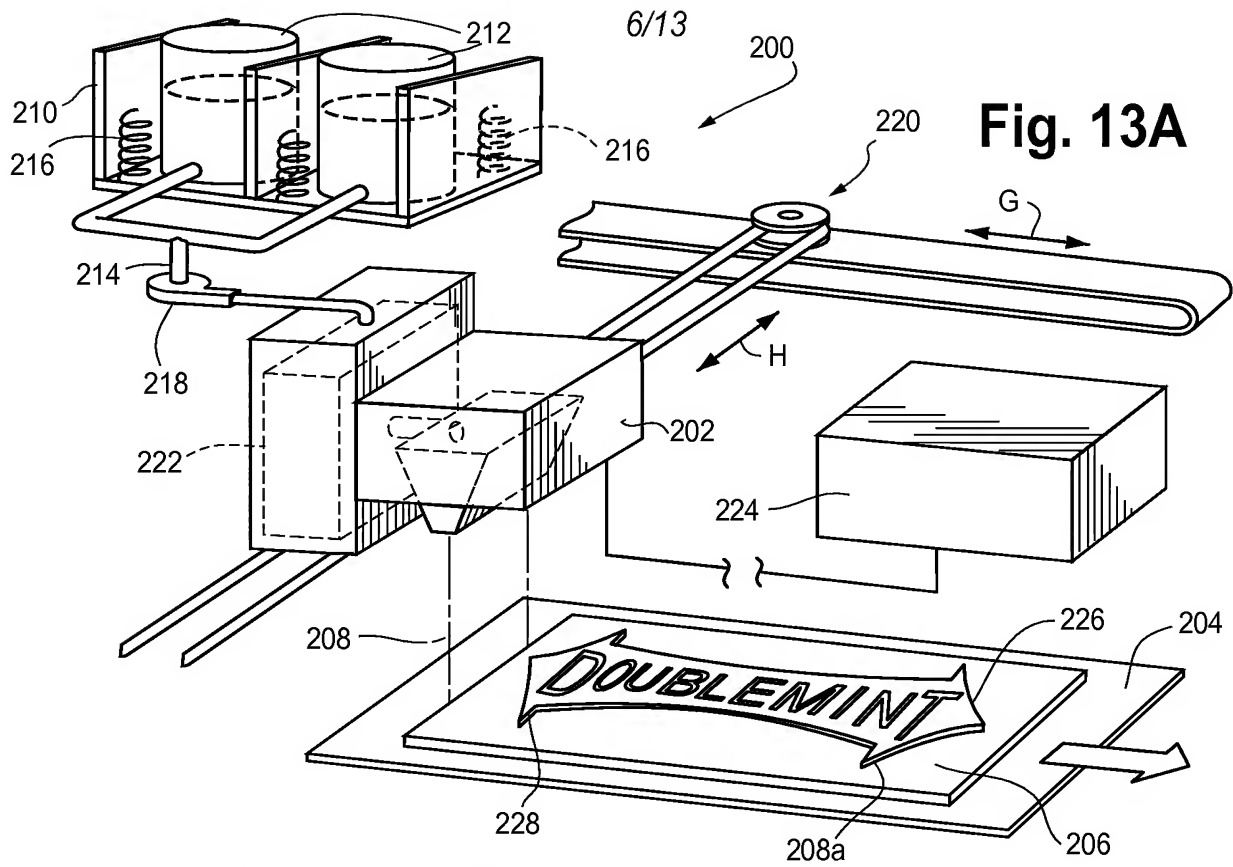


**Fig. 11**

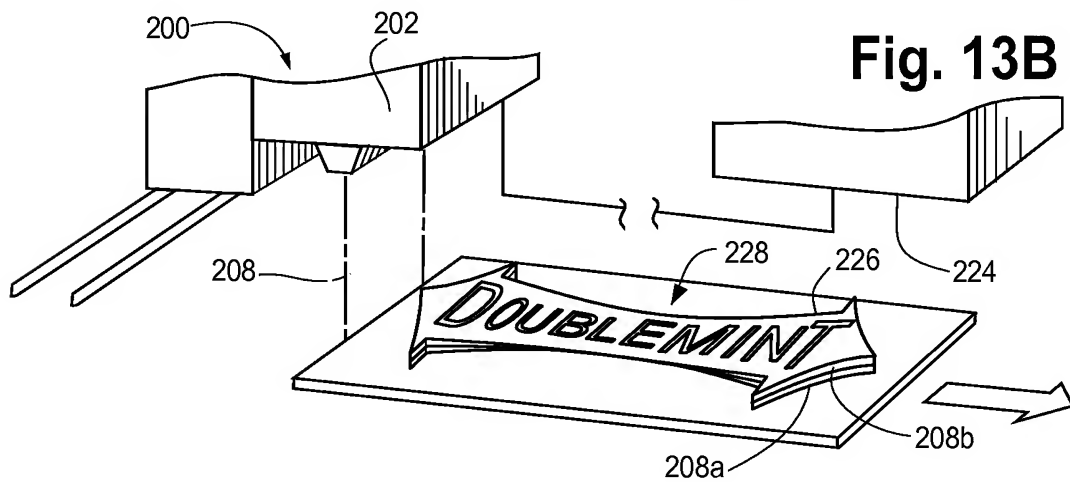


**Fig. 12**

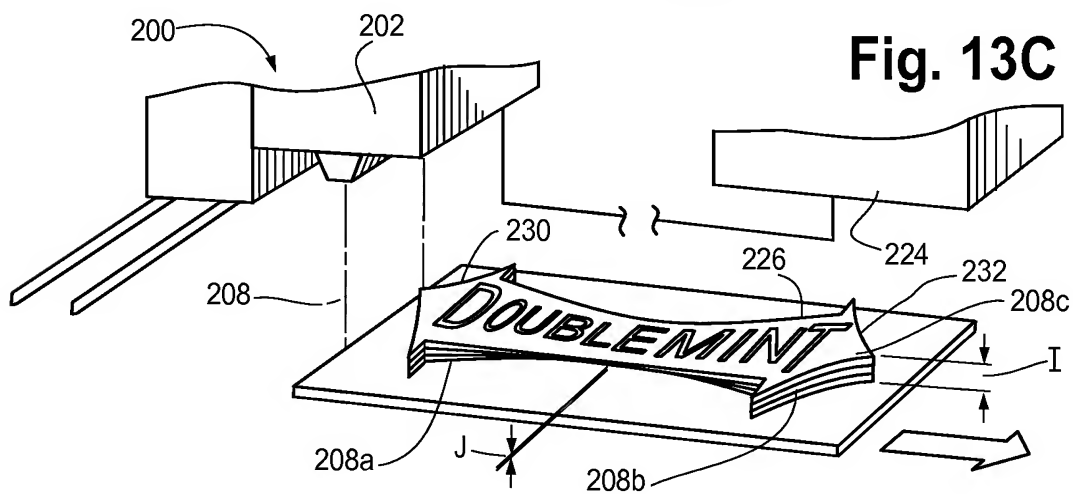




**Fig. 13A**

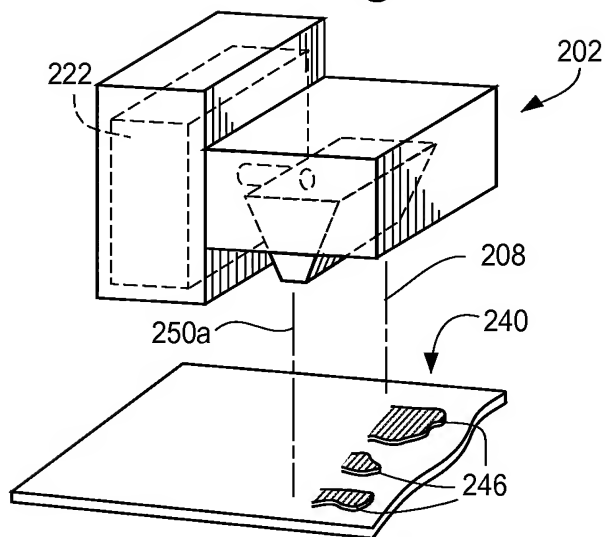


**Fig. 13B**

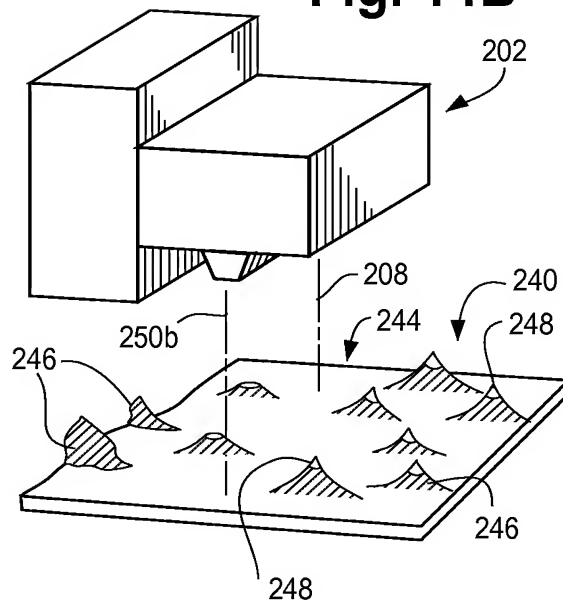


**Fig. 13C**

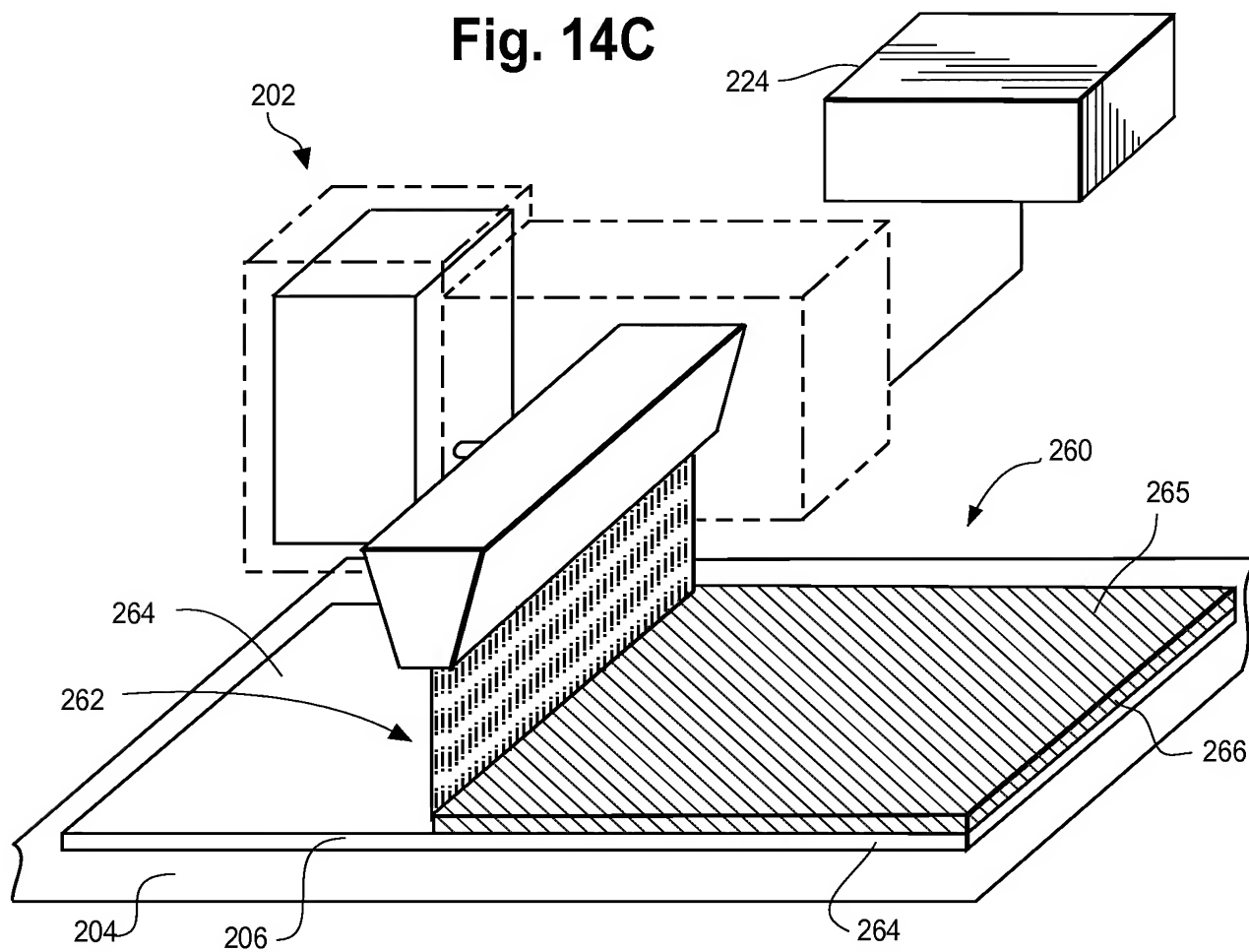
**Fig. 14A**



**Fig. 14B**

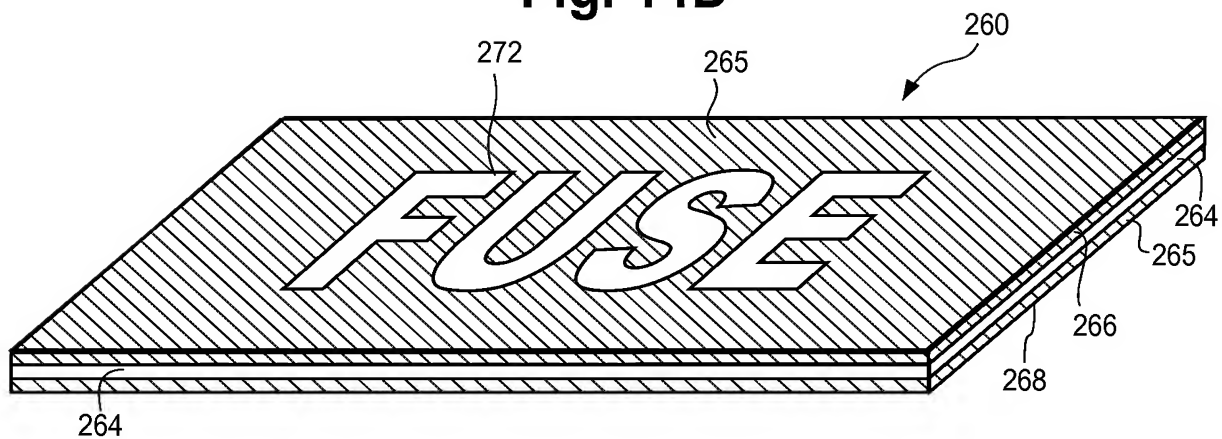


**Fig. 14C**

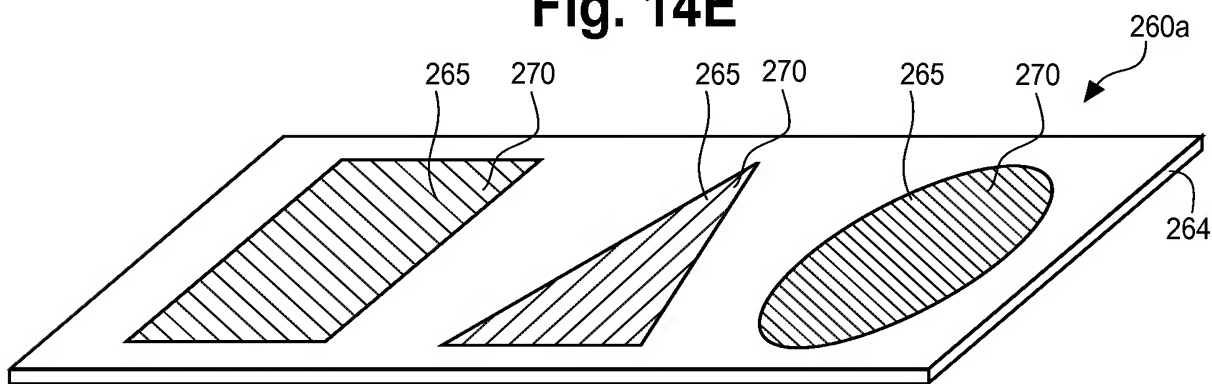


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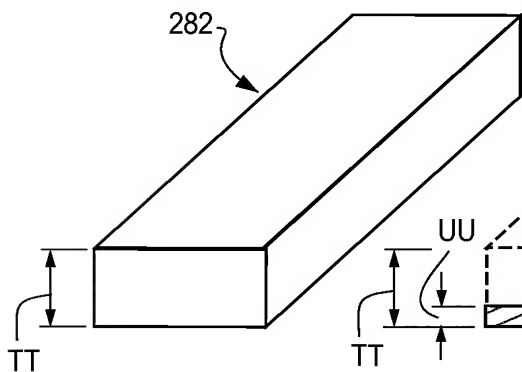
**Fig. 14D**



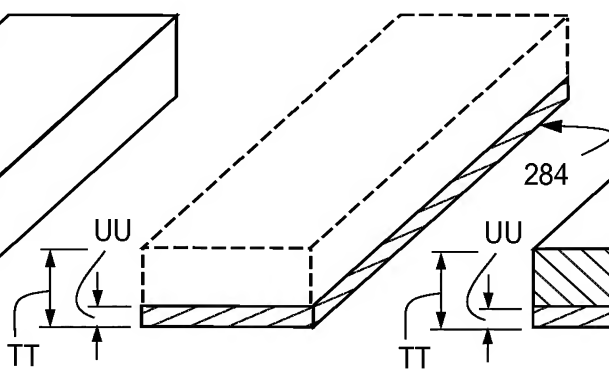
**Fig. 14E**



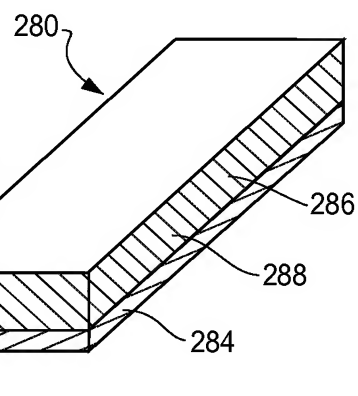
**Fig. 14F**



**Fig. 14G**



**Fig. 14H**



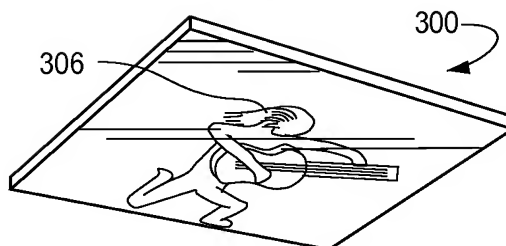


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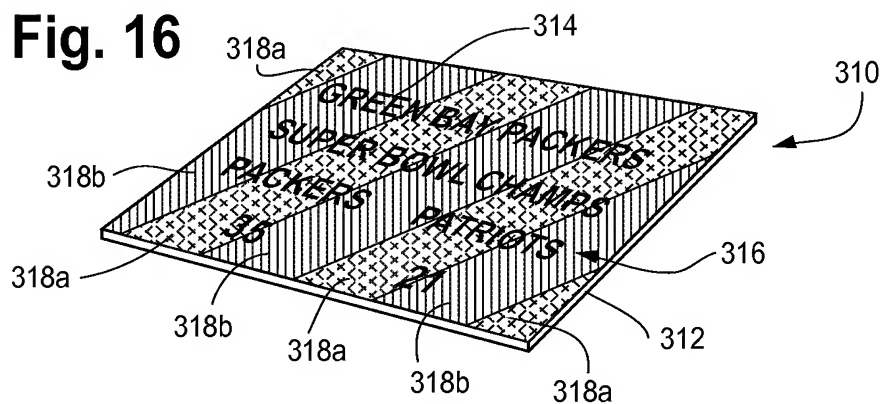
**Fig. 15A**



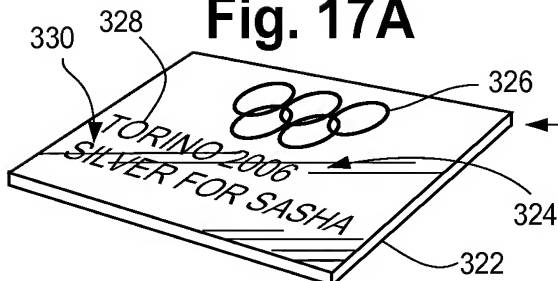
**Fig. 15B**



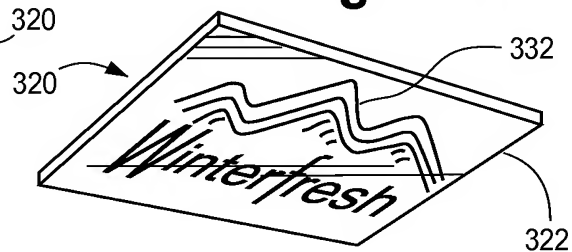
**Fig. 16**



**Fig. 17A**

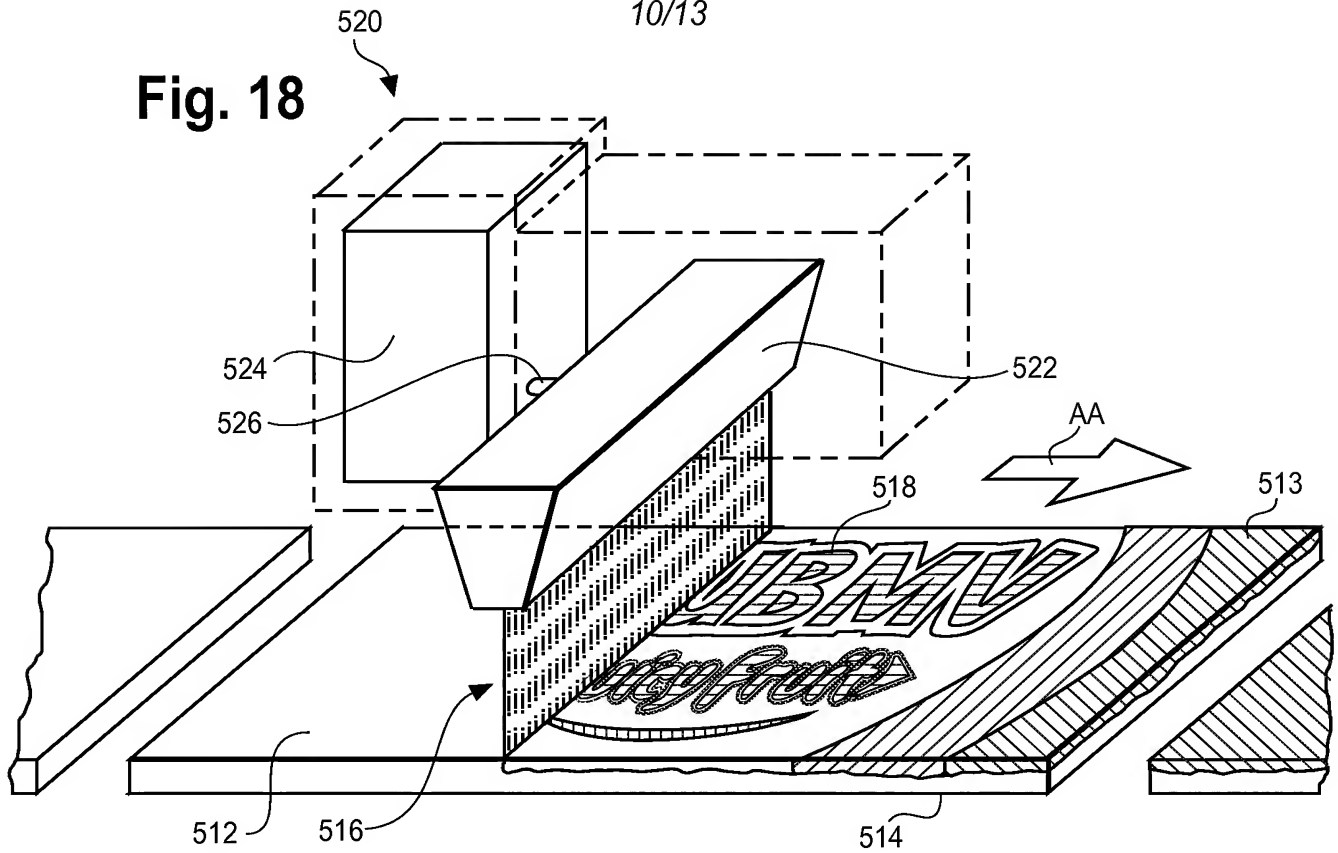


**Fig. 17B**

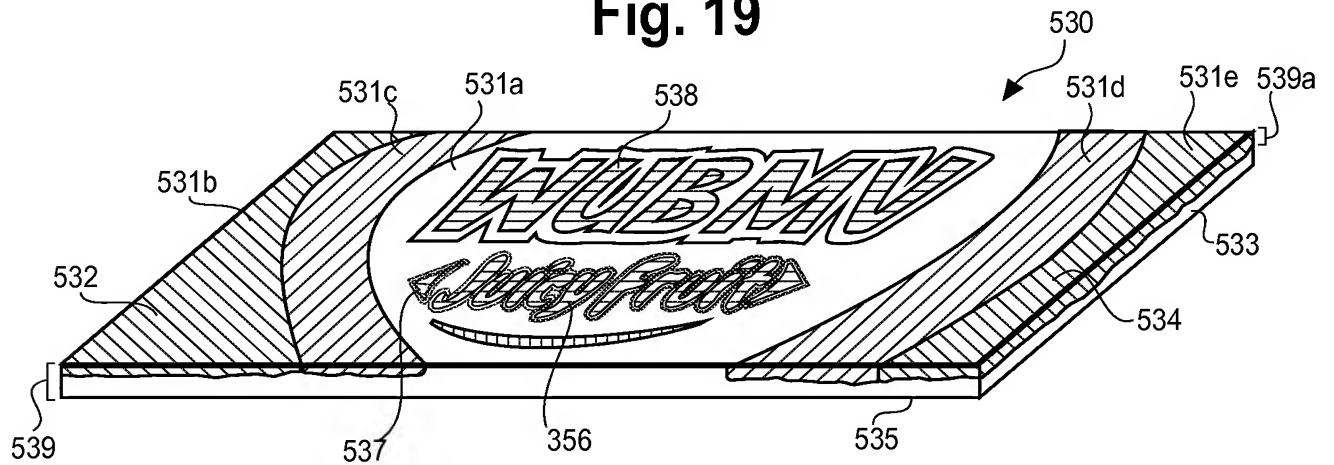


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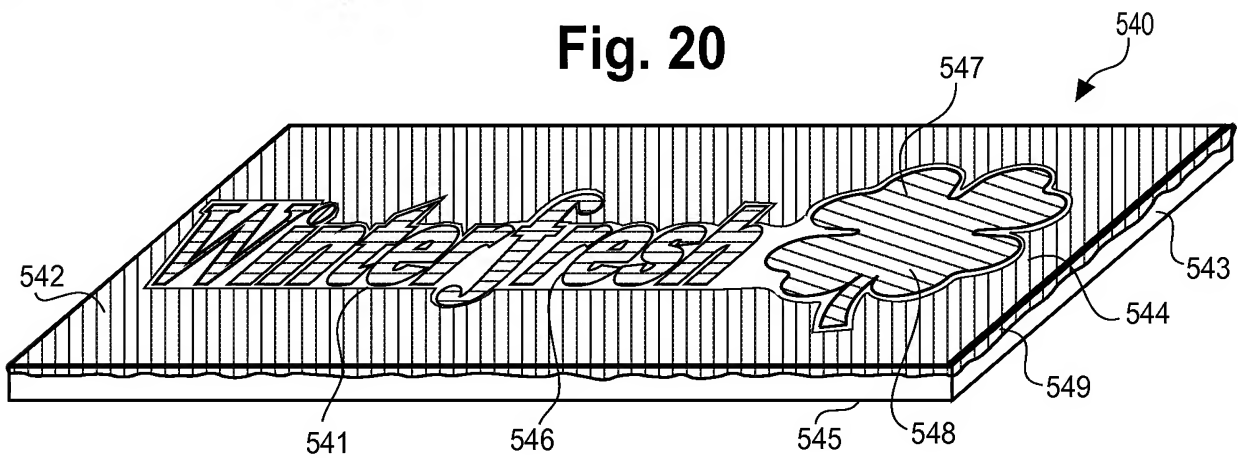
**Fig. 18**



**Fig. 19**

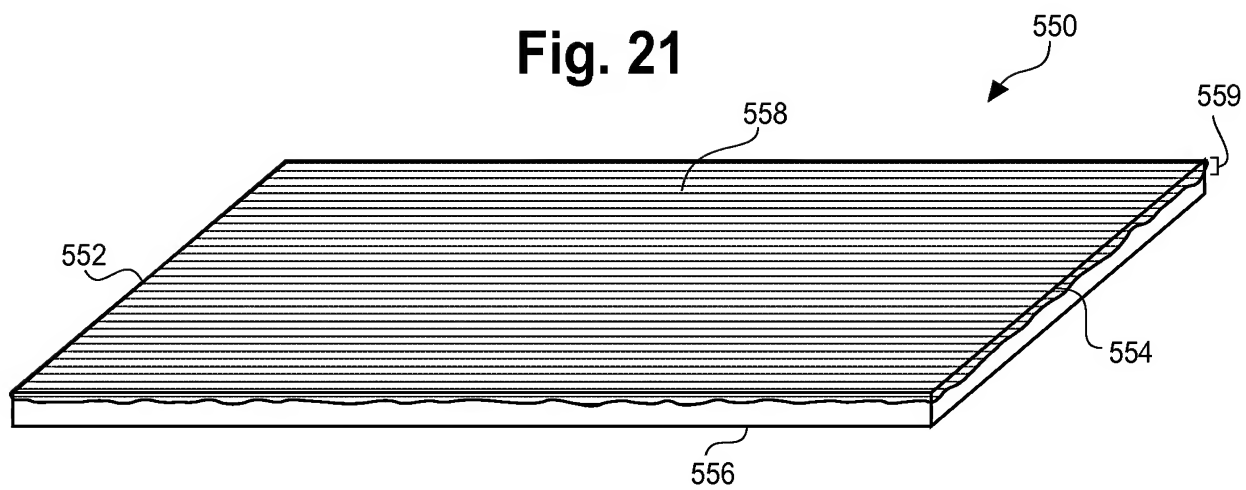


**Fig. 20**

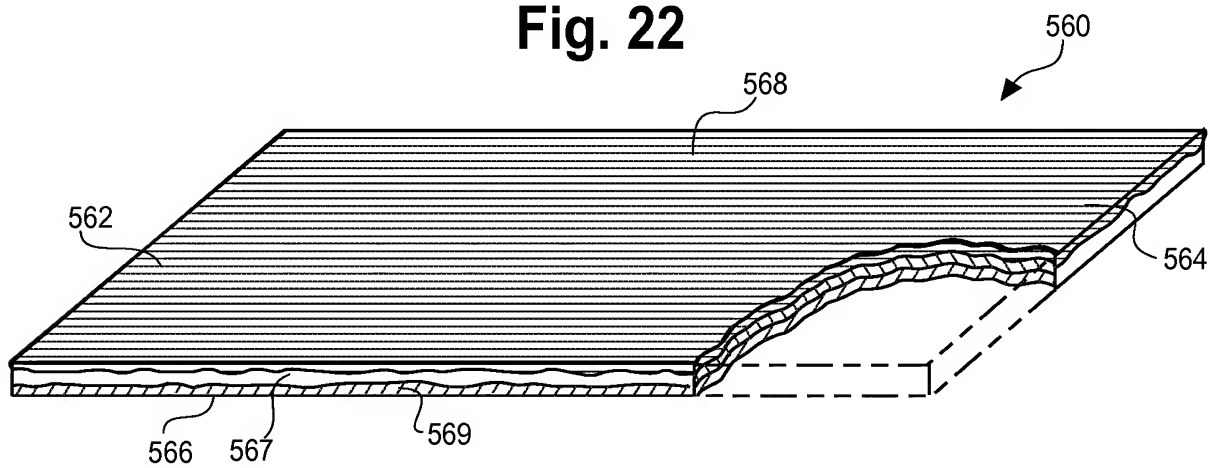


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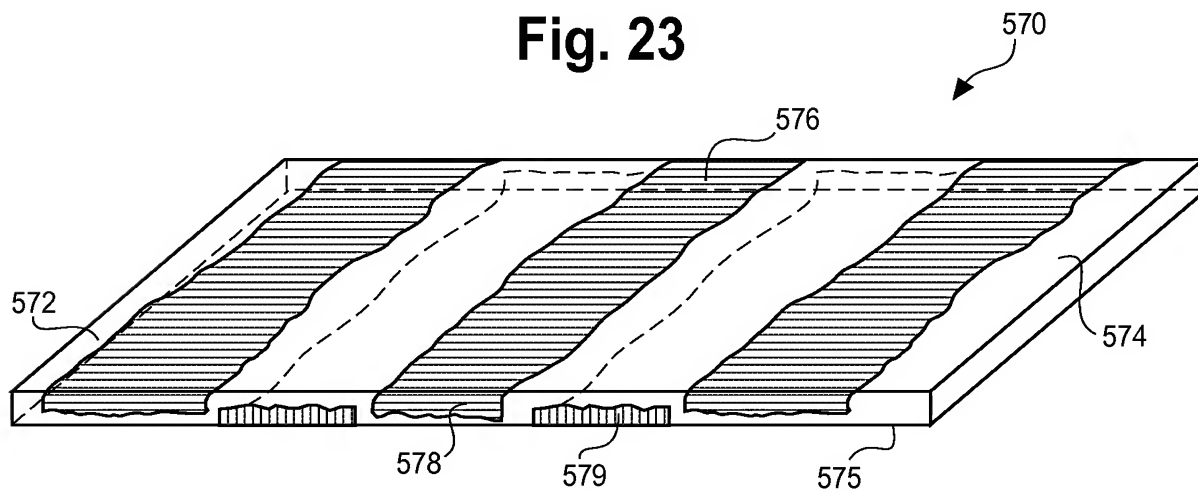
**Fig. 21**



**Fig. 22**

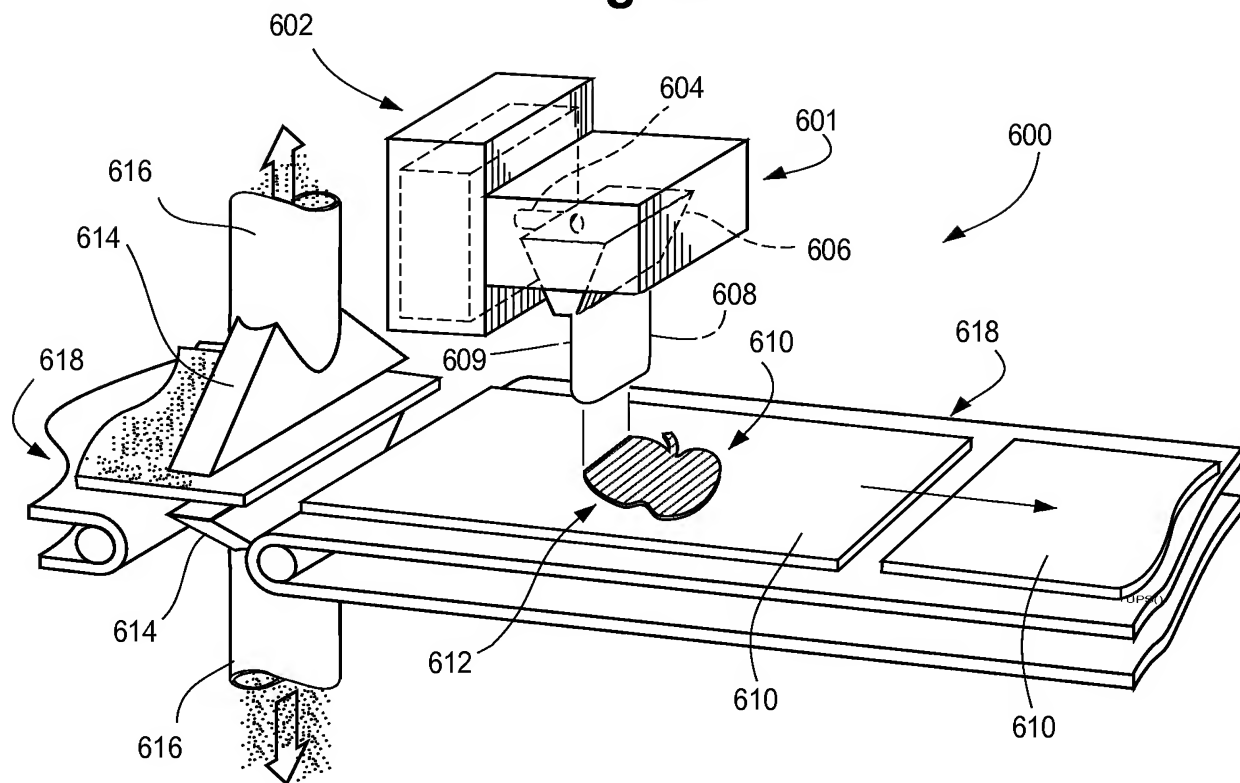


**Fig. 23**

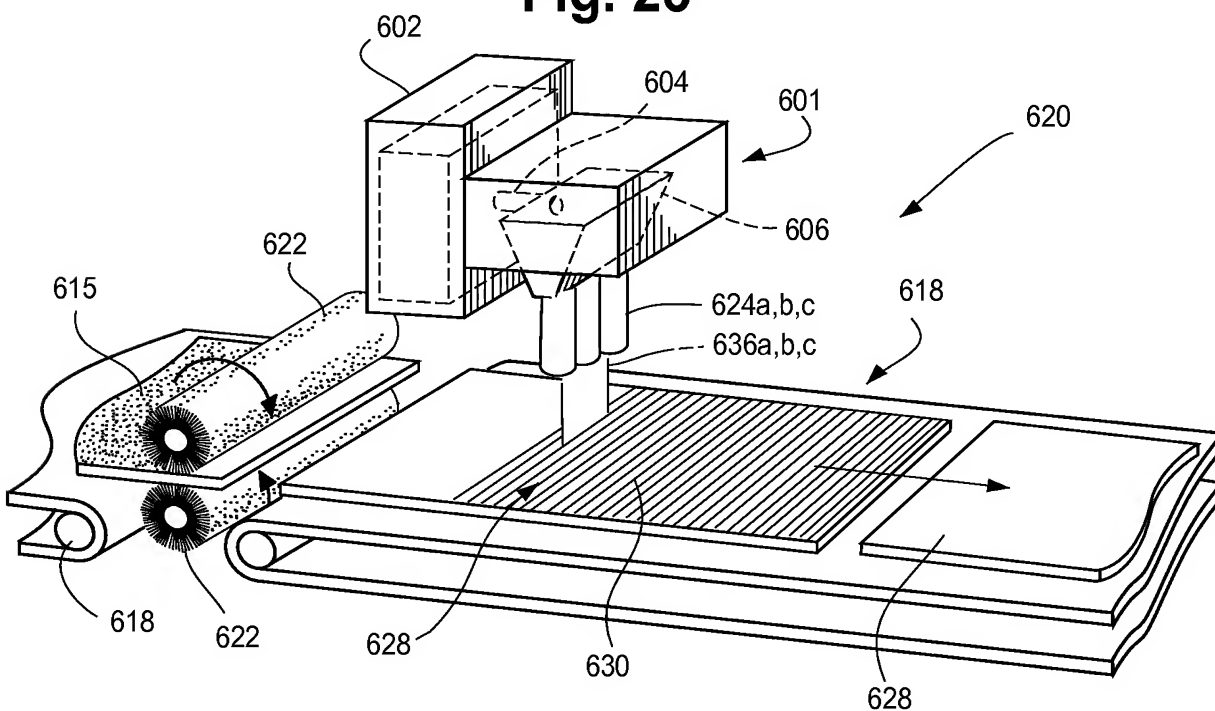


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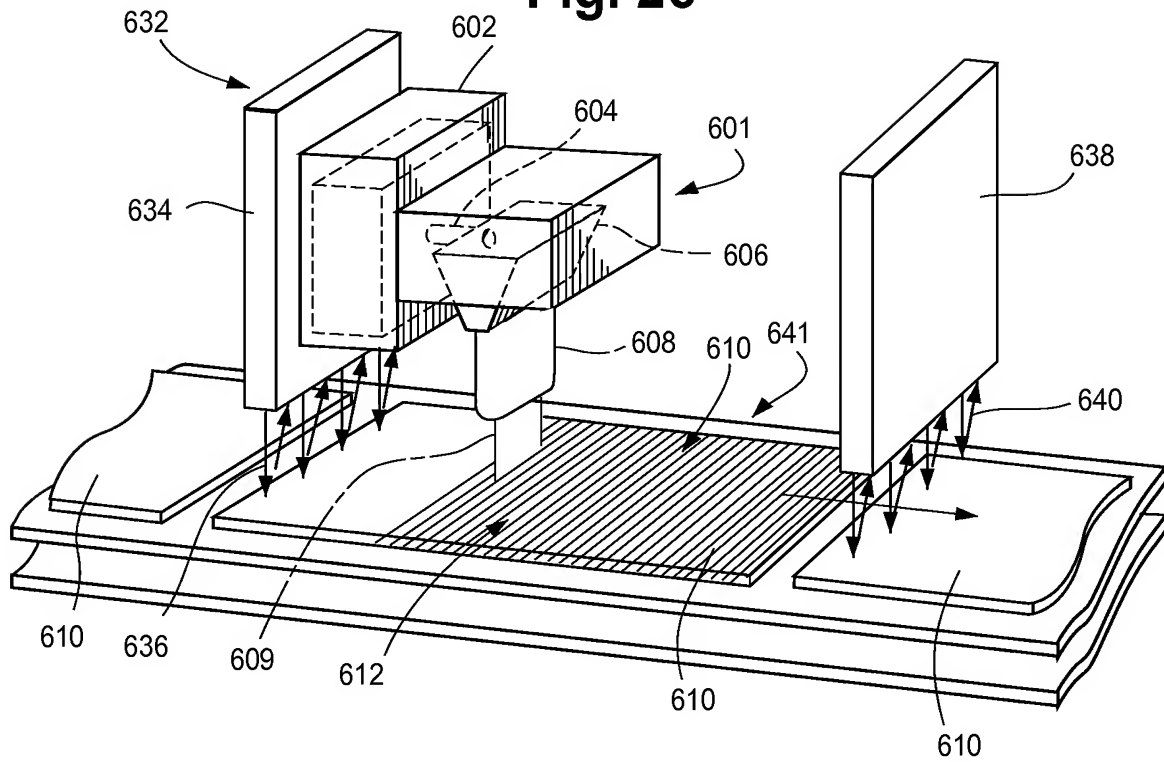
**Fig. 24**



**Fig. 25**



**Fig. 26**



**Fig. 27**

